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U. S. DEPARTMENT OF AGRICULTURE.

DIVISION OF AGROSTOLOGY.

[**Grass and Forage Plant Investigations.**]

STUDIES

ON

AMERICAN GRASSES.

I. THE GENUS IXOPHORUS.

By F. LAMSON-SCRIBNER.

II. A LIST OF THE GRASSES COLLECTED BY DR. E. PALMER IN  
THE VICINITY OF ACAPULCO, MEXICO, 1894-95.

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III. SOME MEXICAN GRASSES COLLECTED BY E. W. NELSON IN  
MEXICO, 1894-95.

By F. LAMSON-SCRIBNER and JARED G. SMITH.

IV. SOME AMERICAN PANICUMS IN THE HERBARIUM BEROLI-  
NENSE AND IN THE HERBARIUM OF WILLDENOW.

By THEO. HOLM.

V. NATIVE AND INTRODUCED SPECIES OF THE GENERA HOR-  
DEUM AND AGROPYRON.

By F. LAMSON-SCRIBNER and JARED G. SMITH.

VI. MISCELLANEOUS NOTES AND DESCRIPTIONS OF NEW  
SPECIES.

ISSUED FEBRUARY 6, 1897.



WASHINGTON:  
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## LETTER OF TRANSMITTAL.

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U. S. DEPARTMENT OF AGRICULTURE,  
DIVISION OF AGROSTOLOGY,  
*Washington, D. C., November 12, 1896.*

SIR: I have the honor to transmit herewith and to recommend for publication as a bulletin of this division several technical papers on grasses which together may be entitled Studies on American Grasses. Enumerations of grasses of little explored regions, descriptions of new or little known genera and species, with a revision of the North American species of *Hordeum* and *Agropyron*, are included in these studies. Also a report upon certain *Panicums* in the Berlin Herbarium, by Mr. Theo. Holm, who was authorized by the Secretary to make the necessary examinations when in Europe in 1894.

Respectfully,

F. LAMSON-SCRIBNER,  
*Agrostologist.*

Hon. CHAS. W. DABNEY, Jr.,  
*Assistant Secretary.*

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# STUDIES ON AMERICAN GRASSES.

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## I. THE GENUS *IXOPHORUS*.

By F. LAMSON-SCRIBNER.

Thirty-four years ago Schlechtendal, in a paper on *Setaria* Beauv., published in the thirty-first volume of *Linnaea* what he stated might at pleasure be regarded a section of *Panicum* or a distinct genus, naming it *Ixophorus*. This genus (or section) was established upon a grass collected by Schiede in December, 1834, at Atlacomulco, Mexico, and the *Urochloa uniseta* of Presl (Reliq. Haenk., 319, 1830), of which he only had a fragmentary specimen. Little was known of these grasses by other European botanists, and Bentham, who had never seen them, referred *Ixophorus* to *Setaria*, and in this he was followed by Hackel. The grasses placed in *Ixophorus* by Schlechtendal were apparently overlooked by collectors for many years, no specimens having been found until 1886, when Dr. E. Palmer collected what is evidently Presl's *Urochloa uniseta*, at Tequila, in the State of Jalisco (Palmer, No. 372), and three years later another species was discovered by Mr. C. G. Pringle in the valley of the Rio Grande de Santiago (No. 2423, Pringle, 1889). The same form as that collected by Pringle was, in 1891, collected by Dr. Palmer at Colima (No. 1256). Through the kindness of Dr. Trelease, I have been enabled to examine a typical specimen of Presl's species contained in the Bernhardi collection in the herbarium of the Missouri Botanical Garden. The specimens collected by Palmer in 1886 are identical with *Urochloa uniseta* Presl, and a study of the material now in hand has led me to believe that the special characters which these grasses present are of generic value, and that *Ixophorus* is a well-established genus.

### A REVISION OF THE SPECIES.

***Ixophorus* Schlecht.** *Linnaea*, XXXI, 420 (1861 and 1862). Spikelets with one terminal hermaphrodite or female flower, with a larger male one below it, very short pedicellate, imbricate and uniserrate along the branches of a simple panicle, the pedicels, as well as the main axis and primary branches, produced beyond the spikelets into slender smooth and viscid awn-like bristles, which equal or exceed the spikelets in length. Glumes, 4, the first very short and 3-nerved, the second a little shorter than the third and many-nerved, the third 5-nerved and much exceeding the punctate-scabrous, 5-nerved, fertile glume, which is flattened and bisulcate on the back, with a distinct hippocrateriform scar near

the base, and mucronate or short awn-pointed. Palea of the male floret equaling the glume, at first hyaline, the margins becoming broadly alate and cartilaginous in fruit. Stamens 3. Styles long, distinct; stigmas aspergilliform. Grain oblong obtuse, compressed, free within the fruiting glume and palea. Rather broad-leaved annual (or perennial?) branching grasses with a simple panicle inflorescence of unilateral racemes.

Allied to *Panicum* Sect. *Ptycophyllum*, but distinguished by having the awn-like continuations of the branches smooth and viscid, by the broadly winged palea of the male flower, and by the comparatively short and mucronate-pointed fourth glume, which is flattened on the back and longitudinally bisulcate. The smooth bristles, the winged palea of the third glume, combined with the characters presented by the fourth glume and the inflorescence, are deemed sufficient for the establishment of the genus. Neither Bentham nor Hackel had seen species of *Ixophorus* when they referred it to *Setaria* (see B. & H. Gen., Pl. III, p. 1105; Hackel, True Grasses, p. 79), and Schlechtendal made no note of the wing-like development of the palea of the third glume in fruit.

Species, 2 or 3; Mexico.

***Ixophorus unisetus* (Presl) Schlecht.** (Plate I). An erect branching grass, with compressed culms 2 to 3 feet high, compressed sheaths, and numerous alternate racemes arranged on a continuous axis, forming terminal panicles 3 to 10 inches long. Culms smooth, alternately sulcate between the nodes; sheaths shorter than the internodes, rather loose, with scarious margins above; ligule a line long, membranous; leaf blades 8 to 10 inches long, 5-18 lines wide, scabrous on both sides at least toward the apex, and along the margins. Racemes  $2\frac{1}{2}$  to 4 inches long, the axis somewhat 3-angled, flower-bearing to near the base, scabrous, the apex excurrent into a slender, smooth, somewhat viscid awn, as are the very short scabrous pedicels of the spikelets. Spikelets about two lines long, ovate-lanceolate, subacute; the first glume broadly ovate, acute, 3 nerved, less than half a line long; second glume broadly lanceolate or ovate, acute 9- to 11-nerved, one-fifth shorter than or nearly equaling the spikelet; third glume lanceolate acute, 5-nerved, 2 lines long, inclosing a staminate flower; fourth glume chartaceous, minutely punctate-scabrous, 3-nerved, scabrous at the tip, and short mucronate-pointed; palea of the third glume equaling it in length, at first thin-membranous, the margins becoming broadly alate and cartilaginous in fruit; palea of the fourth glume equaling it in length, and of similar texture, rounded, obtuse at the apex.—Schlecht. in Linnaea 31, p. 421 (1861-62); *Urochloa uniseta* Presl Reliq. Haenkei, 319 (1830); *Panicum palmeri* Vasey in Contr. U. S. Natl. Herb., 1, No. 8, 281; *Ixophorus schiedeana* Schlecht. (?). No. 372 E. Palmer (1886).

Schlechtendal, in his description of *Ixophorus schiedeana*, calls it a tall panic grass about 3 feet high, glabrous, except the axis of the inflorescence, with linear acuminate leaves and crowded racemes arranged along the continuous axis. He says of his plant that it is more robust than Presl's, but they agree in the structure of the spikelets, excepting that the relation of the glumes to each other is a little different. While I am not prepared to assert positively that Schlechtendal's species (*I. schiedeana*) is identical with *I. unisetus*, I believe them to be the same. Certainly from the dimensions given, it must be distinct from the following:

***Ixophorus pringlei* Scribn., n. n. (*Panicum schiedeanum* Beal, not Trin.).** (Plate II.) Culms 6 to 18 inches high, much branched below; nodes smooth, the lower more or less geniculate and sometimes rooting. Leaves 2 to 8 inches long, 2 to 5 lines wide, acute, scabrous on the margins, otherwise smooth. Panicle  $1\frac{1}{2}$  to 4 inches long; racemes 3 to 15, one-half to  $2\frac{1}{2}$  inches long, erect or ascending, rarely horizontal, pubescent at the base, scabrous along the angles, bristles flexuose, 3 to 4 lines long, viscid. Spikelets subsessile, about 2 lines long, first and second glumes obtuse. Otherwise as in *I. unisetus*. Valley of the Rio Grande de Santiago, State of Jalisco, Mexico. No. 2047 (1888) and 2423 (1889) Pringle. In these

specimens the panicle bears 2 to 6 racemes, which are from one-half to 1 inch long.

Var. *minor* var. nov. Slender, much branched, 6 to 12 inches high, leaves 1 to 3 inches long, 2 to 5 lines wide, bristles about as long as the spikelets, which are 1½ to 1¾ lines long. Colima, Mexico, No. 1256 E. Palmer, 1891.

## II. A LIST OF THE GRASSES COLLECTED BY DR. E. PALMER IN THE VICINITY OF ACAPULCO, MEXICO, 1894-95.

By F. LAMSON-SCRIBNER.

The statements relative to the habitat, distribution, economic value, etc., in the following list are from Dr. Palmer's notes.

**Paspalum platycarpe** Poir. (*Paspalum compressum* Nees). Found in thick masses around a spring in the higher mountains. The upright stems often 2 feet high, with leaves 7 to 9 inches long. February, 1895 (420).

**Panicum paspaloides** Pers. In thickets along river bottoms. December, 1894 (289).

**Panicum sanguinale** L. One specimen only, found in a garden, where the soil was moist. March, 1895 (549). From characters this is *Panicum inaequale* Fourn.

**Panicum sanguinale** L. var. *breviglume* Trin. forma *distans* Doell. Found among weeds in a dried-up river bed. February, 1895 (446).

**Panicum sanguinale** L. var. *longiglume* Doell. A common grass in ravines, often covering the stony surfaces. November, 1895 (112).

**Panicum insulare** Meyer (*Panicum leucophyllum* HBK., *Andropogon insulare* L.). Among thorny bushes in river bottoms. December, 1894 (288).

**Panicum brevifolium** L. In a shady spot near a water hole. December, 1894 (287).

**Panicum divaricatum** L. A cane-like grass along river banks in the dense under-brush. November, 1894 (114).

**Panicum compactum** Sw. In similar situations with the last. November, 1894 (115). This is the same as 283 Liebmann.

**Oplismenus cristatus** Presl (*O. humboldtianus* var. *genuinus* Fourn., excl. syn.). Found in large masses on river bottoms in the thick, shady woods. October, 1894 (35). Brandegee 22 (1890); Palmer 1258 (1891); Fendler 363 (1850). This species has been confused with *O. humboldtianus* Nees, from which it is distinguished by the somewhat longer and more densely pilose empty glumes, which are deeply 2-lobed at the apex; the third glume has a dense ring or crown of stiff white hairs on the back just below the middle; the flowering glume is shorter than the first empty one. *O. humboldtianus* is represented in the National Herbarium by No. 1363 Turckenheim and No. 3120 A. Conduz (Herb. Inst. Costa Rica).

**Cenchrus tribuloides** L. Common on sandy beaches. December, 1894 (290). This is a low diffusely branching form with only a few heads on each stalk. It is the same as a specimen in the National Herbarium, collected near Rio Janeiro, by the Wilkes expedition.

**Cenchrus multiflorus** Presl. This grass, which grows to the height of 2 to 4 feet, and is eaten when young by cattle, occurs in depressions among the rocks from near the water's edge to the summit of the slopes facing the sea. November, 1894 (75),—Liebmann 341, referred to by Fournier.

**Pennisetum purpurascens** HBK. Growing in clumps 5 to 6 feet high, among the oaks on the higher mountain slopes. February, 1895 (433).

**Antephora elegans** Schreb. Found in masses in shaded rocky ravines. October, 1894 (38). A small decumbent form rooting at the lower joints. The short (1 to 3 inches long) leaves and sheaths pilose or villous.

**FOURNIERA** Scribn., gen. nov. Tribe *Zoysiea*. Plants dioecious. Spikelets dissimilar, solitary and sessile at the alternate notches of a continuous flexuous

rachis, readily falling off at maturity from the small, cushion-like barbate pedicel. Rachis alternately striate and sulcate. Staminate spikelets 2-flowered, the first floret sessile, the second raised on a short naked stipe or joint of the rachilla; rachilla not prolonged beyond the second floret. Outer empty glumes 3; 2 narrowly oblong, obtuse, 1-nerved; 1 larger, oblong, and obtuse; flowering glumes 3-nerved, the second 3-cleft, the divisions awn-like. Stamens, 3. Pistillate spikelets 1-flowered, with a 3-awned prolongation of the rachilla above the flower; outer empty glumes 3, equal, cuneate, broadest above, narrowed below into a short and rather densely *pilose*, pedicel-like base or claw; 2 broadly truncate and unequal, rounded at the apex, one of which is 2- to 3-nerved, the other 3- to 5-nerved; the third glume, occupying the position of a second empty glume, is a little narrower than the others, 1-nerved, and somewhat 3-lobed at the broad

apex; flowering glume raised upon a short stipe or joint of the rachilla, 3-nerved, 3-cleft at the apex, the middle division longest and sometimes 2-toothed, the mid-nerve projecting between the teeth; styles distinct; stigmas plumose. A delicate, much-branched, creeping perennial, with simple erect spikes, the rachis projecting beyond the uppermost spikelet into a short, 2-cleft prolongation.

Species, 1; Mexico.

**Fourniera mexicana**, sp. nov. (Figs. 1, 2, 3.) Extensively creeping, sending up tufted branches 2 inches to 1 foot high. Sheaths loose, striate, smooth, usually much shorter than the leaves; ligule very short, ciliate, leaves one-half to 3 inches long, a line wide or less, very minutely scabrous on the nerves beneath and smooth or sparingly pilose above. Spikes terminal and axillary, often 3 or 4 naked flowering branches from the uppermost or terminal leaf-sheath, as in *Cathestecum*, the slender spikes bearing from 3 to 15 spikelets. Staminate spike-

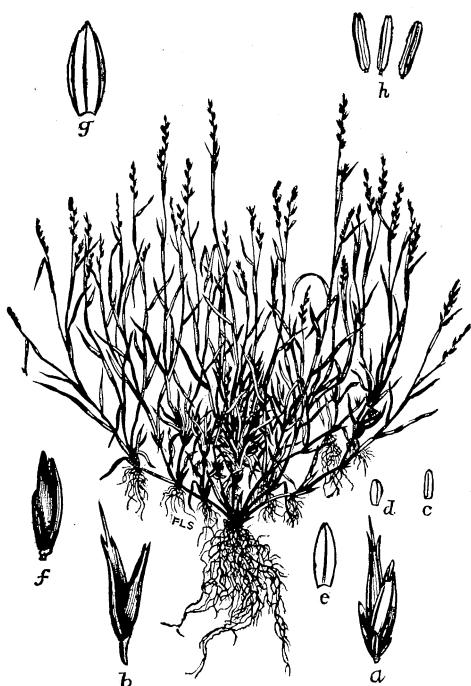


FIG. 1.—*Fourniera mexicana*, male plant: *a*, spikelet; *b*, second floret; *c*, *d*, *e*, the three outer glumes (*e* corresponds to *e* in fig. 2); *g*, the floral glume of the same; *h*, stamens. The details are all drawn upon the same scale.

lets 2 to  $2\frac{1}{2}$  lines long, two of the outer empty glumes about one-half line long, occupying the position of the first glume, that is, standing at the back of the first floral glume; the third glume, occupying the position of the second glume, broader, and a line long; first flowering glume  $1\frac{1}{2}$  lines long, thin membranous, smooth, rounded on the back, apex entire or indistinctly 3-toothed; palea longer than the glume, strongly 2-nerved, with broad infolded margins; second flowering glume nearly 2 lines long, including the awn-like extension of the mid-nerve, smooth; palea about as long as the glume. Pistillate spikelets about 2 lines long exclusive of the awns; outer glumes 1 to  $1\frac{1}{2}$  lines long, scabrous on the back, the narrow pedicel-like base of each densely pilose; flowering glume  $1\frac{1}{2}$  lines long, 3-cleft at the apex, the middle division longest, and sometimes 2-toothed, the mid-nerve projecting between the teeth; palea about as long as the glume; rachilla and flowering glume very smooth, the short division of the latter

minutely scabrous, the awns which terminate the prolongation of the rachilla 3 to 4 lines long, somewhat dilated below, and softly ciliate along the margins, scabrous above. Found by Dr. Palmer in a deep cut in the mountains near Acapulco, Mexico, growing in loose, gravelly soil, October, 1894. "A fine grass, which is eaten with avidity by sheep and goats" (Nos. 41 and 43). The three outer glumes appear to originate upon the same plane, forming a whorl (see fig. 3). The two occupying the position of a first glume may represent a single glume divided to its base, or one of them may represent a scale-like prolongation of the partial axis supporting the spikelet, or it may even stand for a second spikelet of a group of two.

**Arundinella martinicensis** Trin.

Growing in large bunches in sags of the higher mountains. February, 1895 (434). Culms 5 to 6 feet high, leafy below, naked above, smooth; sheaths longer than the internodes, tumid at the base, and very densely pubescent toward the apex; leaves 10 to 18 inches long, 5 to 8 lines wide when dried, papillate-pilose on the upper surface; ligule very short, membranous; panicle 6 to 12 inches long, densely flowered, the numerous branches erect; spikelets straw-colored, about  $2\frac{1}{2}$  lines long; perfect floret 1 line long; callus obtuse, bearded on the sides; awn  $3\frac{1}{2}$  lines long, slender, twisted below, geniculate and divergent above.

**Aristida jorullensis** Kth. (*Streptachne pilosa* HBK., *Ortachne pilosa* Nees.). Rabbit grass. Eaten when young, or when better feed is scarce. Low bottom lands; also in the mountains, and common along roadsides. October, 1894 (36).

**Sporobolus domingensis** Kth.

Found on a dry rocky slope overlooking the ocean. Eaten when young by all kinds of stock. November, 1894 (74.)

**Eleusine indica** Gaertn. On low bottom lands. November, 1894 (120).

**Dactyloctenium aegyptium** Willd. Low bottom lands. November, 1894 (121).

**Bouteloua repens** (HBK.). Found on the highest mountains and down their stony slopes to the water's edge. Eaten by all grass-eating animals. November, 1894 (113).

**Opizia stolonifera** Presl. (Fig. 4). One of the most important grasses of Mexico, growing close to the ground, forming a thick turf over all exposed surfaces, even over the cobble-paved streets. It is difficult to find seeds or good specimens, owing to the



FIG. 2.—*Fourniera mexicana*, female plant: a, terminal portion of rachis with two spikelets; b, a spikelet; c, d, e, outer glumes (e may represent a glume-like continuation of the secondary axis supporting the spikelet, or it may represent a second spikelet of a cluster of two); f, flowing glume raised upon a short joint of the rachilla (stipe); g, palea. At the left of a is a 3-awned prolongation of the rachilla. The pistil is shown in the upper left-hand corner.

constant nibbling of domestic animals. The staminate and pistillate plants are sometimes separated in large patches, or they may grow closely intermingled. This grass is used in the public squares with good effect, as the regular watering keeps it fresh and green, and but little cutting is necessary.



FIG. 3.—*Fourniera mexicana*. Diagram of male and female spikelets.

The generic characters for *Opizia* given by Presl (Reliq. Haen., 1: 293) are very imperfect, and are drawn apparently from the female plant, which alone he figures (Pl. 41, f. 1). Fournier revised the generic characters of this grass (Bull. Soc. Roy. Bot. Belg., XV, 471), but failed to understand the structure of the female spikelets, overlooking the minute first glume and thus mistaking the second glume for the first, the flowering glume for the second, and the palea for the flowering glume. Bentham, who had never seen *Opizia*, drew up the characters for the "Genera Plantarum" from those published by Fournier, and they were reproduced by Hackel without change. Baillon (Hist. de Plant., CXVIII, Graminées, 271) first correctly describes the female spikelets and caryopsis. The figures here presented were drawn from Dr. Palmer's specimens, and are designed to show the true structure of the female spikelets, including the minute first glume, which is scarcely longer than the hairs at the base and which has so long been overlooked. It may be said that the length of the awns varies a good deal, as do the lobes or divisions of the flowering glume. The stigmatic hairs are remarkably long and lax. The female spikelets are disposed in short, terminal spikes, while the staminate spikelets are imbricated in unilateral racemes, very closely resembling those of *Bulbilis* (Buchlōe). The rachilla supporting the triaristate rudimentary floret in the pistillate spikelets is adnate to the palea for nearly its entire length. (Fig. 4.)

*Gouinea virgata* (Presl) Scribner. In tufts among the underbrush on hillsides. November, 1894 (77).

There are 3 species of *Gouinea*, 2 Mexican and 1 South American. The latter is represented in the National Herbarium by No. 928 Morong, plants of South America, distributed as *Triodia latifolia* (Griseb.). The species may be separated as follows:

1. Branches of the panicle flower-bearing above the middle, naked below,  
*G. latifolia*.
1. Branches of the panicle flower-bearing to near the base..... 2
2. Awns 1 line long or less; culms stout, 4 to 7 feet..... *G. mexicana*.
2. Awns 4 to 6 lines long; culms slender, 1 to 3 feet..... *G. virgata*.

***G. virgata*** Scrib., *Bromus virgatus* Presl in Reliq. Haen., 263. *G. polygama* Fourn. Mex. Pl. Enum., Gram. 103. *Festuca fournieriana* Hemsl. 505 Liebmann, St. Augustine, Mex., also 1087 E. Palmer, from Manzanillo, distributed as *Leptochloa* (?) *palmeri* Vasey.

***G. mexicana*** Scrib. nom. nov. *Leptochloa* (?) *mexicana* Scrib. in Proc. Acad. Nat. Sci. Phila. 1891, p. 302. No. 3252 Pringle, 1890.

***G. latifolia*** Scrib. nom. nov. *Tricuspidis* (*Neuroblepharum*) *latifolia* Griseb. Plant. Lorenz., p. 259. No. 928 Morong.

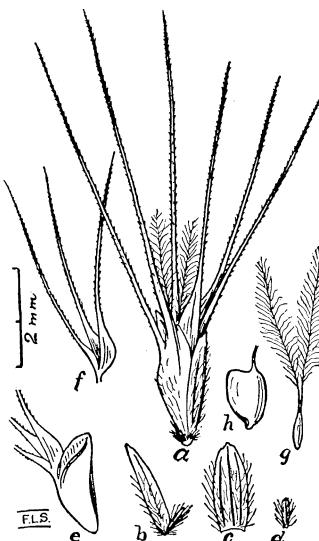


FIG. 4.—*Opizia stolonifera*: a, female spikelet; b, empty glumes; c, second empty glume; d, first empty glume; e, palea and adnate sterile rudimentary floret (f); g, pistil; h, caryopsis.

**Eragrostis ciliaris** Link. Found in small bunches here and there on the steep rocky hillsides. October, 1894 (39).

**Eragrostis plumosa** Link. Found in moist shady spots in gardens and on river bottoms. October, 1894 (40).

**Eragrostis reptans** Nees. Growing in patches along the edge of alkaline spots surrounding a lagoon. March, 1895 (596). This is the form known as *Poa hypnoides* Lam.

**Eragrostis amœna** Presl. The specimens collected were found in a low wet place. The grass is not common. December, 1894 (286). Pringle's 3334, collection of 1890, from Guadalajara is the same. Pringle's specimens were referred to *Eragrostis vahlii* Nees, (see Scribn. Proc. Acad. Nat. Sci. Phila. 1891, p. 304), *Eragrostis amanda* being cited as a synonym. *Eragrostis vahlii* Nees is a taller, more branched paniculate form of South America, and is possibly specifically distinct from the Mexican grass here referred to.

**Jouvea straminea** Fourn., not Scribn. In large masses at the edge of a low damp place in a garden near the river bank. Plant produces long runners. Avoided by grass-eating animals. February, 1895 (443)=Liebmann 738. The female and what appears to be the male plant are also in the collection. This grass is very distinct, as shown by the female plants, from *Jouvea straminea* Scribn. (Bull. Torr. Bot. Club, 17: 227), *Rachidospermum mexicanum* Vasey (Bot. Gaz., 15, 110). The plants are much more slender throughout, the leaves less rigid, the so-called spikes longer and much more slender, and the supposed spikelets free from the rachis in their upper half, as described by Fournier. These female spikes are less crowded, the internodes being much longer than in *Jouvea straminea* Scribn. There is a little uncertainty as to the staminate plants of the true *Jouvea straminea*. Dr. Palmer assures me, however, that the ♂ specimens in hand were collected in the same locality as the female plants. These staminate plants are more slender, with longer and less rigid leaves than those which are undoubtedly the male plants of *Jouvea pilosa*. There is little difference, however, to be noted in the spikelets of the two.

**Jouvea pilosa** (Presl.) Scribn. (Bull. Torr. Bot. Club, 23: 143.) Found on the deep sands of the seashore in dense patches of greater or less extent. Too hard to be eaten by animals. December, 1894 (235). This grass is the *Rachidospermum* of Vasey; *Jouvea straminea* Scribn., not Fourn.; *Uniola pungens* Rupr. in Bull. Acad. Royal. Brux., vol. 9 (excluding the synonym); *Brizopyrum pilosum* Presl, Rel., Haen., 1, 280. Presl's and Ruprecht's species were founded upon male plants. This species is represented in National Herbarium as follows: Liebmann 480 (Santa Cruz), ♂; E. Palmer 124 (La Paz, 1890), ♂ ♀; Xantus 121 (Cape San Lucas), ♂; Brandegee 42 (San Jose del Cabo, 1890), ♂ ♀; Palmer 1384 (Manzanillo), 1890, ♀; Liebmann 479 (St. Augustine, 1842), ♂.

### III. SOME MEXICAN GRASSES COLLECTED BY E. W. NELSON IN MEXICO, 1894-95.

BY F. LAMSON-SCRIBNER and JARED G. SMITH.

The grasses here enumerated form a part of a general collection made in southern Mexico by Mr. Nelson under the direction of the Division of Biological Survey of this Department.

**Saccharum cayennense** Benth. (*Eriochrysis cayanensis* Beauv.). Vicinity of Choapam, Oaxaca; altitude, 3,800 to 4,500 feet. July 28, 1894; 886. Table-land about Ocuilapa, Chiapas; altitude, 3,400 to 3,800 feet. August 21, 1895; 3041, 3063. Culms 2 to 3 feet high.

**Elionurus tripsacoides ciliaris** Hack. Along a roadside between San Ricardo and Ocozcuantla, Chiapas; altitude, 2,600 to 3,300 feet. August 18, 1895; 2990.

**Andropogon hirtiflorus pubiflorus** Hack. Mountain ridge on the west side of the valley of Cuicatlan, Oaxaca; altitude, 6,500 to 8,000 feet. November 10, 1894; 1903. Leaves smooth and glaucous, hirsute toward the base, leaf sheath hirsute at the throat; culm nodes bristly pubescent; sessile spikelet about 7 mm. long, hairs at the base about 2 mm. long, hairs on the pedicel longer above; awn 25 mm. long, twice geniculate; anthers 1 mm. long; back of the first glume hairy below. In No. 1904 the first glume of the sessile spikelet is smooth, oblong, obtuse, about 5.5 mm. long, ciliate hispid along the keels near the apex; pedicellate spikelet staminate, the anthers 2 mm. long; awn 20 mm. long, and twice geniculate.

**Andropogon tener** Kth. Along roadsides between Tuxtla and San Christobal, Chiapas; altitude 2,800 to 5,500 feet. September 14, 1895; 3108.

**Andropogon nutans stipoides** Hack. Roadside between San Ricardo and Ocozcuantla, Chiapas; altitude, 2,600 to 3,300 feet. August 18, 1895; 2967. Table-land about Ocuilapa, Chiapas; altitude, 3,400 to 3,800 feet. August 21, 1895; 3008.

**Andropogon bracteatus** Willd. Near Yjalon, Chiapas. November 21, 1895; 3399.

**Nazia racemosa aliena** n. n. (*Lappago alienas* Spreng., *Lappago racemosa erecta* Kunth., *Tragus occidentalis* Nees.) Valley of Oaxaca; altitude 5,000 to 5,300 feet. September 20, 1894; 1278.

**Paspalum conjugatum** Berg. Table-land about Ocuilapa, Chiapas; altitude, 3,400 to 3,800 feet. August 21, 1895; 3055. Culms 1 to 2 feet high.

**Paspalum erianthum** Nees. Vicinity of San Juan Guichocovi, Oaxaca; altitude 450 to 1,500 feet. June 23, 1895; 2735, 2735a. A Brazilian species not previously reported from Mexico.

**Paspalum fastigiatum** Nees. Between Guichocovi and Lagunas, Oaxaca; altitude 600 to 900 feet. June 27, 1895; 2738. This agrees with 203 Liebmann, identified as above by Fournier, except that there are usually three empty glumes instead of two.

**Paspalum lividum** Trin. Tlacotalpam, Orizaba, Vera Cruz. May 21, 1894; 523.

**Paspalum plicatulum** Mx. Efigenia, Oaxaca; altitude 500 feet. July 18, 1895; 2853.

**Paspalum squamatum** Fourn. Vicinity of Totontepec, Oaxaca; altitude 5,500 to 7,000 feet. July 15, 1894; 727. This is the same as 198 Liebmann, and 2640 Bourgeau. Very near, if not identical, with *P. mandiocianum* Trin.

**Paspalum stellatum** Flugge. Near Caucue, Chiapas; altitude 4,800 to 5,500 feet. November 24, 1895; 3424.

**Paspalum virgatum** L. Table-land about Ocuilapa, Chiapas; altitude 3,400 to 3,800 feet. August 21, 1895; 3035, 3047. Culms 3 to 6 feet high.

**Anthenaanthia lanata** Benth. Vicinity of San Juan Guichocovi, Oaxaca; altitude, 450 to 1,500 feet. June 21, 1895; 2734.

**Eriochloa nelsoni** Scribn. & Smith, sp. nov. Culms branching from the base, ascending, 2 feet high, pubescent throughout; leaf-sheaths shorter than the internodes, ligule very short, ciliate; leaf-blades soft, flat, 3 to 6 inches long, linear-lanceolate, acuminate, pubescent on both sides; inflorescence terminal and lateral, long exserted, the main axis triquetrous, hirsute-pubescent; spikes 3 to 4, about 1 inch long, shortly pedicellate, sub-distant, erect or ascending, the triquetrous rachis narrow, hirsute; spikelets acute,  $3\frac{1}{2}$  lines long, on pubescent pedicels 1 line long at alternate joints of the rachis; empty glumes subequal obtuse or truncate, 5-nerved, appressed, ciliate on the back for the lower two-thirds, naked above and minutely scabrous; flowering glume smooth and shining, 2 lines long, obtuse, minutely cuspidate at the apex, with a pit or depression at the base. Caryopsis obovate, one-third shorter than the flowering glume, minutely reticulated. A very minute additional empty glume is sometimes present at the base of the spikelet.

Hills east of Cuicatlan, Oaxaca, Mexico; altitude, 2,000 to 4,000 feet. No. 1707, 1894. It has larger spikelets than any other species except *E. annulatus grandispicula* Doell., from which it may be readily separated by the form of the inflorescence.

**Isachne disperma** Doell. Chicharras, Chiapas; altitude, 3,000 to 6,000 feet. February 6, 1896; 3764.

**Panicum bulbosum** HBK. Eighteen miles southwest of the city of Oaxaca; altitude, 7,500 to 9,500 feet. September 12, 1894; 1374.

**Panicum biglandulare** Scribn. & Smith, sp. nov. (Plate IV.) Culms decumbent or ascending, branching, wiry, compressed, 2 to 4 feet long; nodes tumid; sheaths shorter than the internodes, open above, finely striate, glabrous except along the margins, which are clothed with glands bearing branching hairs; ligule a line of short hairs; leaves lanceolate, acuminate, rounded or subcordate at the base, and with a short pedicel one-half line long, sparsely glandular hispid on both sides, 2 to 4 inches long, 6 to 9 lines wide; inflorescence a racemose panicle about 4 inches long, the alternate, erect, sub-distant racemes 6 to 8 lines long, the main axis and its branches slender, angled, sparsely ciliate; spikelets alternate, almost sessile, 2 lines long; lowest empty glume ovate acute mucronate, 3-nerved, bristly hispid all over, nearly one-half line long, the bristles nearly as long as the glume; second empty glume nearly 2 lines long, elliptical-ovate acute, 7-nerved, bristly hispid all over, the bristles shorter than those of the first glume; third glume 2 lines long, 5-nerved, ovate, abruptly narrowed above and acute, laterally compressed, subventricose, scarious along the margins, bristly hispid along the lateral nerves, purplish, and bearing two glands, one on either side of the mid-vein, just above the middle; its palea scabrous on the keels to the base; fertile flowering glume 1 line long, narrowly lanceolate-elliptical, acute, coriaceous, smooth and shining; palea as long as its glume. Near Pinabete, Chiapas, February 8, 1896, at an altitude of 6,500 to 8,000 feet; No. 3781. Closely related to *Panicum uncinatum* Raddi, from which it differs in having more robust culms and larger leaves, smaller spikelets, the third glume with only two glands, and in the form of the inflorescence, which is similar to that of *Opismenus*.

**Panicum carthaginense** Swz. Along a roadside between San Ricardo and Ocozcuantla, Chiapas; altitude, 2,600 to 3,300 feet. August 18, 1895; 2958. Culms 2 to 3½ feet high.

**Panicum crus-ardeæ brevisetum** Doell. (*Setaria effusa* Fourn.). Table-land about Ocuilapa, Chiapas; altitude, 3,400 to 3,800 feet. August 21, 1895; 3059. Tall grass 4 to 8 feet high.

**Panicum divaricatum** L. (*P. divaricatum latifolium* Fourn.). Near Tlalixtaquila, Guerrero. December 10, 1894; 2254.

**Panicum fasciculatum genuinum** Doell. Between Topana, Oaxaca, and Tonala, Chiapas; altitude, 200 to 500 feet. August 1, 1895; 2874.

**Panicum filiforme** L. var. ? (*Paspalum velutinum minus* Fourn.). Along roadsides between Tuxtla and San Cristobal, Chiapas; altitude, 2,300 to 5,500 feet. September 14, 1895; 3118. Culms 3 to 12 inches high; sheaths and leaf blades villose-hirsute; spikes mostly in threes, subdigitate, 1 to 1½ inches long; empty glumes densely ciliate.

**Panicum glutinosum** Swz. Turubula, Chiapas; altitude, 4,000 to 5,500 feet. October 25, 1895; 3357.

**Panicum horizontale** Jacq. Ocuilapa, Chiapas; altitude, 3,400 to 3,800 feet. October 21, 1895; 3049.

**Panicum oajacense** Steud. Table-land about Ocuilapa, Chiapas; altitude, 3,400 to 3,800 feet. August 21, 1895; 3055.

**Panicum pilosum** Swz. Table land about Ocuilapa, Chiapas; altitude, 3,400 to 3,800 feet. August 21, 1895; 3056.

**Panicum prostratum** Lam. Vicinity of Cuicatlan, Oaxaca; altitude, 1,800 to 2,500 feet. October 20, 1894; 1622.

**Panicum sulcatum** Aubl. Turubula, Chiapas; altitude, 4,000 to 5,500 feet. October 26, 1895; 3359. Culms 4 to 6 feet high.

**Panicum xalapense** HBK (teste Fourn.). Boca del Monte, Orizaba, Vera Cruz. This is the same as 2162 Bourgeau and 328 Liebmamn. March 13, 1894; 201. Very near *P. laxiflorum* Lam.

**Panicum zizanioides** HBK. Table-land about Ocuilapa, Chiapas; altitude, 3,400 to 3,800 feet. August 21, 1895; 3023. Culms 10 to 18 inches high.

**Opismenus cristatus** Presl. Vicinity of Cuicatlan, Oaxaca; altitude, 1,800 to 2,500 feet. October 10, 1894; 1649.

**Opismenus liebmanni** Fourn. Near Reyes, Oaxaca; altitude, 5,800 to 6,700 feet. October 20, 1894; 1772.

**Opismenus loliaceus** Beauv. Hacienda Mirador, Vera Cruz. February, 1894; 109. This is the same as 366 Liebmamn.

**Opismenus setarius** R. & S. Table-land about Ocuilapa, Chiapas; altitude, 3,400 to 3,800 feet. August 21, 1895; 3025.

**Setariopsis latiglumis** (Vasey) Scribn., Pub. Field Columbian Mus., Bot. Ser. I, 289 (1896). Tuxtla, Chiapas; altitude, 2,400 to 2,800 feet. September 6, 1895; 3083.

**Setariopsis auriculata** (Fourn.) Scribn. l. c. Vicinity of Cuicatlan, Oaxaca; altitude, 1,800 to 2,500 feet. October 14, 1894; 1601.

**Pennisetum bambusaeforme** Vasey (*Gymnothrix bambusaformis* Fourn.). Plunia, Oaxaca; altitude, 3,000 to 4,800 feet. March 17, 1895; 2484.

**Pennisetum multiflorum** Fourn. Along roadsides between San Ricardo and Ocozucuantla, Chiapas; altitude, 2,600 to 3,300 feet. August 18, 1895; 2985. Culms 2 to 4 feet high. Table-land about Ocuilapa, Chiapas; altitude, 3,400 to 3,800 feet. August 21, 1895; 3065.

**Pennisetum setosum** Rich. (*P. purpurascens* HBK.). Between Petatlan and Chilapa, Guerrero; altitude, 5,000 to 6,500 feet. December 15, 1894; 2149. Near Tuxtla, Chiapas; altitude, 2,400 to 2,800 feet. September 1, 1895; 3090. Culms 4 to 5 feet high.

**Savastana mexicana** Beal, Grasses N. Am., II, 187, (*Hierochloë mexicana* Benth., *Ataxia mexicana* Fourn.). Summit of Mount Zempoaltepec, Oaxaca; altitude, 11,400 feet. July 9, 1894; 624.

**Aristida fasciculata micrantha** Vasey. Cuicatlan, Oaxaca; altitude 1,800 to 2,300 feet. October, 1894; 1654. This agrees with Vasey's type in habit, but the second empty glume is shorter than the flowering glume.

**Aristida schiediana** Trin. & Rupr. Near Reyes, Oaxaca; altitude, 6,700 to 10,000 feet. October 20, 1894; 1807.

**Stipa cærulea** Presl. Vicinity of Cerro San Felipe, Oaxaca; altitude, 9,500 to 11,000 feet. 1894; 1107. This agrees with Presl's description, except in having the leaves shorter than the culms. It is evidently closely related to *S. fimbriata* HBK.

**Stipa virescens** HBK. Eighteen miles southwest of the city of Oaxaca; altitude, 7,500 to 9,600 feet. September 10, 1894; 1373.

**Oryzopsis fournieriana** Hemsl. (*Stipa brevicalyx* Fourn.). Eighteen miles southwest of the city of Oaxaca; altitude, 7,500 to 9,500 feet. September 12, 1894; 1373a.

**Muhlenbergia affinis** Trin. Near Reyes, Oaxaca; altitude, 6,700 to 10,000 feet. October 20, 1894; 1806. Mountain ridge on west side of the valley of Cuicatlan, Oaxaca; altitude, 6,500 to 8,000 feet. November 10, 1894; 1905.

**Muhlenbergia ciliata** Trin. Valley near Cuicatlan, Oaxaca; altitude, 1,800 feet. November 3, 1894; 1869.

**Muhlenbergia debilis** Trin. About Cuicatlan, Oaxaca; altitude, 2,800 to 4,000 feet. 1894; 251, 1703a.

**Muhlenbergia distichophylla** Kth. Near Reyes, Oaxaca; altitude, 5,800 to 6,700 feet. October 20, 1894; 1780.

**Muhlenbergia gracilis** Trin. High ridge west of San Miguel Huantla, Oaxaca; altitude, 7,000 to 8,500 feet. November 11, 1894; 1910.

**Lycurus phalaroides** HBK. (*Muhlenbergia lycuroides* Vasey; *Lycurus brevifolius* Scribn.). San Cristobal, Chiapas; altitude, 7,000 to 8,800 feet. September 18, 1895; 3228. This agrees with HBK's description, except that the leaf sheaths are sparsely hirsute and the upper empty glume is not bifid or trifid at the apex. It is the same as 680 Botteri; 489 Palmer, 1886; and 2470 Pringle, 1889.

**Pereilema crinitum** Presl. Near Reyes, Oaxaca; altitude, 2,500 to 4,000 feet. October 24, 1894; 1822.

**Sporobolus macrospermus** Scribn. in Beal, *Grasses N. Am.*, II, 302 (1896).<sup>1</sup> A slender, densely cespitose annual, 6 to 12 inches high, with rather short, narrow leaves, and an oblong or subpyramidal, open panicle 1 to 3 (usually about 2) inches long. Culms erect, smooth, sometimes branching near the base; sheaths lax, at least the lower ones, and these last sometimes ciliate along the margins and sparingly pilose; ligule nearly obsolete, very minutely ciliate; leaf blade 1 to 2 inches long or less, mostly less than a line wide, broadest at the base, smooth beneath, minutely scabrous above, ciliate along the margins, the hairs springing from distinct papillæ, apex pungent pointed.

Panicle long exserted, the capillary branches spreading, flower bearing above the middle, 5 to 6 in the lower whorl, becoming fewer above, the longer lower branches one-half to three-fourths inch long. Spikelets 1 line long; empty glumes unequal, the first acute and about half as long as the second, which nearly equals the rather obtuse flowering glume; palea hyaline, rather broadly 2-lobed at the apex, and cleft to the base in fruit. Caryopsis somewhat exceeding the flowering glume in length, and protruding from the spikelet between the glumes and the cleft palea. (Fig. 5.)

Along roadsides between Tuxtla and San Cristobal, State of Chiapas, Mexico, No. 3120, September 14, 1895. Also Guadalajara, State of Jalisco, Mexico, No. 2048 Pringle, 1888, and No. 2447 Pringle 1889; granitic soil, hills of Las Sedas, altitude 6,000 feet, State of Oaxaca, Mexico, No. 4943 Pringle, 1894; Laguna de Ayarza, Department of Jalapa, Guatemala, No. 3925 Heyde & Lux, 1892. Very closely related to if not identical with *Sporobolus rupestris* Kunth.

**Epicampes berlandieri** Fourn. Near Reyes, Oaxaca; altitude, 5,800 to 6,700 feet. October 20, 1894; 1778. Between Ayusinapa and Petatlan, Guerrero; altitude, 5,000 to 7,000 feet. December 14, 1894; 2122.

**Epicampes mutica** Rupr. Near Reyes, Oaxaca; altitude, 5,800 to 6,700 feet. October 20, 1894; 1779.

**Trisetum deyeuxioides** Kunth. (*Arena deyeuxioides* HBK; *Deyeuxia triflora* Nees.) West slope of Mount Zempoaltepec, Oaxaca; altitude, 7,700 to 8,000 feet. July 5, 1894; 554. This agrees in the details of the spikelets and in the form of the panicle with 733 Liebmann, collected at Chinantla, May, 1841, but the culm is shorter and more robust, and the leaves are shorter.

**Trisetum paniculatum** Fourn. Between Ayusinapa and Petatlan, Guerrero; altitude, 5,000 to 7,000 feet. December 14, 1894; 2123. A small form.

**Graphephorum pringlei** Scribn. in Beal, *Grasses N. Am.*, II, 561 (1896). A slender, densely cespitose perennial, 1 to 2 feet high, with rather short and narrow leaves, and loosely flowered, open panicles 3 to 4 inches long. Culms erect, smooth, nodes very dark purple; sheaths striate, shorter than the internodes, smooth, or the lower ones more or less pubescent; ligule short, membranous, rounded obtuse, 1 line long or less, decurrent; leaf-blade 1 line or less wide; those at the base 3 to 6 inches long; those of the culm shorter and narrower,

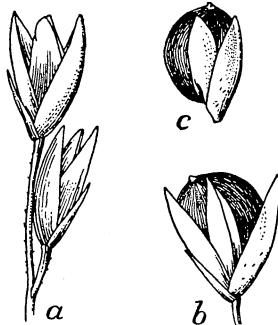


FIG. 5.—*Sporobolus macrospermus*:  
a, spikelets; b, spikelet with ripe  
caryopsis; c, floret, with ripe  
caryopsis.

<sup>1</sup>This description and some others here presented were in type before the publication of Beal's *Grasses of North America*, Vol. II.

sparingly pilose and minutely strigose-scabrous above; panicle branches slender, flexuose, ascending or finally more or less spreading, solitary or two or three together at the nodes and semi-verticillate, naked below, flower-bearing above, the lowermost 2 to 3 inches long. Spikelets ovate lanceolate, acute, 2- to 3-flowered, 2 to 3 lines long; outer glumes unequal, the first narrowly lanceolate and about 1 line long, acute, 1-nerved; the second broader, oblong lanceolate, obtuse, nearly 1½ lines long, 3-nerved; first flowering glume nearly 2 lines long, raised on a distinct callus, lanceolate oblong, obtuse or truncate and erose at the apex, 5-nerved, the mid-nerve often prolonged into a very short awn, the glume barbate at the base and pubescent on the back excepting in the upper third; second and third glumes similar to the first, but somewhat smaller; palea usually about one-fourth shorter than the glume, ciliate along the keels, excepting near the base; joints of the rachilla rather long and densely silky-bearded along the back with rather stiff hairs, prolonged above the uppermost flower into a slender plumose pedicel. (Fig. 6.) Summit of Sierra de San Felipe; altitude, 10,000

feet, State of Oaxaca, Mexico, No. 4765 Pringle, 1894; 1108 E. W. Nelson, same locality. This grass does not agree in all its characters with *Graphephorum*, nor with *Colpodium*, but its affinities are apparently with the former genus.

**Campulosus planifolius** Presl Reliq. Hænk. (*Ctenium glandulosum* Scribn. & Smith, Coul. Bot. Gaz., 21: 362, 1896<sup>1</sup>). Zamatepec, Oaxaca, July 15, 1895; 2814.

**Gouinia virgata** (Presl) Scribn. (*G. polygama* Fourn., *Bromus virgatus* Presl). Near Tlalixtaquila, Guerrero, December 10, 1894; 2255.

**Poa conglomerata** Rupr. Mount Orizaba, Pueblo; altitude, 14,900 to 15,000 feet. March 18, 1894; 287.

**Festuca amplissima** Rupr. Northwest side of summit of Mount Zempoaltepec, Oaxaca; altitude, 10,000 to 11,000 feet. July 9, 1894; 648.

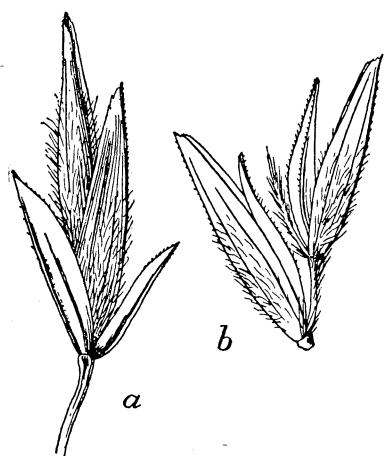


FIG. 6.—*Graphephorum pringlei*.

**Arthrostylidium racemiflorum** Steud. (*Merostachys racemiflorum* Fourn.). Hacienda Mirador, Vera Cruz, February, 1894; 78.

**Chusquea nelsoni** Scribn. & Smith, sp. nov. Culms climbing, geniculate at the nodes, solid, one-fourth inch in diameter, slender, the internodes about 1 foot long with fasciculate lateral branches 8 to 12 inches long from the nodes; leaves 2 to 3 inches long, narrowly lanceolate acuminate, gradually rounding at the base into a short petiole, scabrous above and on the margins, hirsute-canescens below; ligule short, rounded; sheaths finely striate, smooth with a tumid ring at the base; panicle spikelike, contracted, interrupted below, 1 to 2½ inches long, once or twice compound, the branches strict; lowest empty glumes one-half line long, obtuse or truncate, shortly ciliate on the margins above; third empty glume 1½ lines long, ovate-lanceolate, acute, pubescent above, mucronate pointed; fourth empty glume more than half as long as the spikelet, like the third, with an awn 1 line long; flowering glume 3 lines long, 7-nerved, ovate, lanceolate, acuminate, sometimes mucronate, pubescent for the upper two-thirds; palea about as long as its glume, purple, sulcate and bicarinate, emarginate, bifid; stamens, 3; lodicules, 3, slender, acute, not fimbriate, style bifid at the apex. Between Chilapa and Tuxtla, Guerrero, Mexico; altitude, 5,200 to 7,000 feet; December 17, 1894; 2612. This species is related to *C. cummingii* Nees, differing in the shape and size of the lowest empty glumes, the pubescent flowering glume, and the tumid ring at the base of the leaf sheath.

<sup>1</sup> Since this publication the authors have seen a type specimen of *Campulosus planifolius* in the herbarium of the Missouri Botanical Garden, and *Ctenium glandulosum* S. & S. is identical with it.

IV. SOME AMERICAN PANICUMS IN THE HERBARIUM BEROLINENSE AND IN THE HERBARIUM OF WILLDENOW.

By THEO. HOLM.

The specimens which have been examined were mostly collected by American botanists, but several were also collected by Beyrich in the year 1834, and the latter have undoubtedly been revised by Kunth. Willdenow does not give the collector's name in most instances, but, as it will be seen later, some of his plants were collected by Muhlenberg.

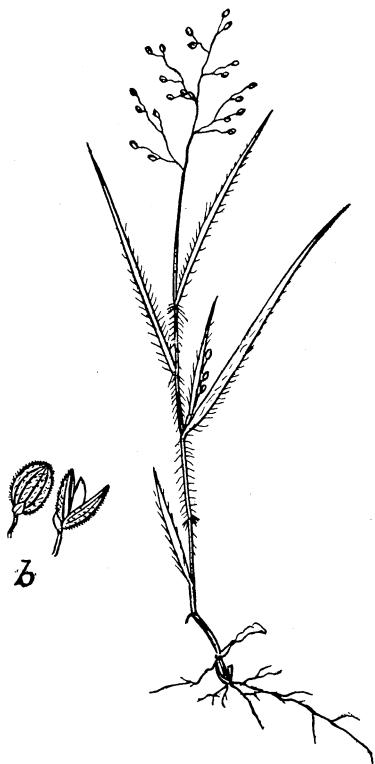


FIG. 7.—“*Panicum laxiflorum* Lam. in fructicetis Caroliniae inf. Beyrich misit 1834:” a, a portion of the culm showing the hairy sheath and bearded node, the culm itself is glabrous; b, two spikelets, second and third glumes striate and downy. (Mus. Berol.)

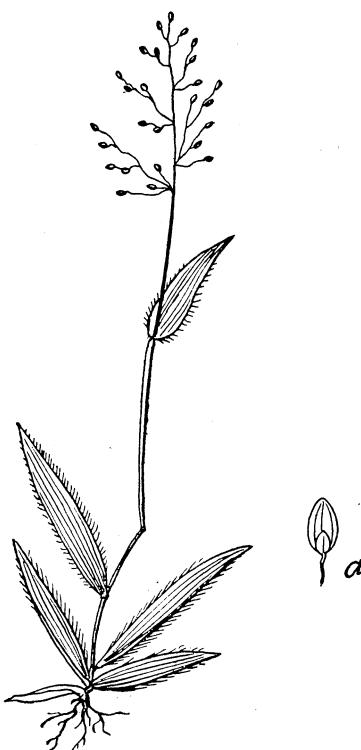


FIG. 8.—“*Panicum ciliatum* Ell., *P. ciliatum* Kth. N. America, legit Engelmann:” a, a spikelet. Leaves ciliate, sheaths and culms glabrous. (Mus. Berol.)

There is no special herbarium of Kunth in Berlin, but his American types are scattered in various herbaria—for instance, in *Herbarium Berolinense* and in those at Kew and Paris. No type specimens were found of the species enumerated by Professor Scribner for special examination, but all the species named below have been examined and compared, most of which are represented in *Herbarium Berolinense*.

Attention is called to a very important fact, that the specimens which have been collected by American botanists are so wrongly identified that several species often occur under the same specific name.

The accompanying 9 figures have been drawn directly from the dried specimens, and give the exact appearance of the specimens and species in question as represented in the herbaria named.

#### PANICUMS IN THE HERBARIUM BEROLINENSE.

**Panicum pauciflorum** Ell. (on species cover). A few specimens, labeled *leucocephalum*, collected in Oregon by Lyall, differ from the specimen submitted by Professor Scribnér in having the pyramidal panicle branches shorter, and in being hairy all over excepting on the spikelets. The inflorescence reminds one very much of *clandestinum* L. The plant is very different from *P. rafinesquianum*=*oligosanthes* Schult. In the same cover are also some specimens of *P. nodiflorum* Lam., which are from Alexander Braun's her-



FIG. 9.—“*Panicum setaceum* Muhl. Panici ramulosi var.? Herb. Hooker No. 100.” Sheaths and lower part of the blades ciliate or pilose, otherwise glabrous; leaves rigid, involute. (Mus. Berol.)  $\frac{1}{2}$  nat. size.

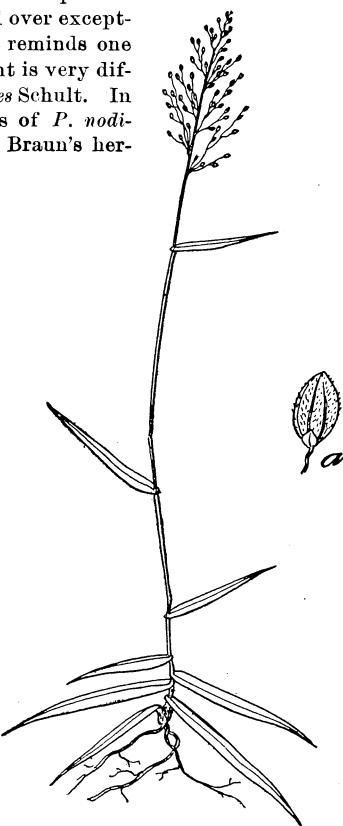


FIG. 10.—“*Panicum cartilagineum* Muhl. Herb. Hooker No. 100.” Second and third glumes pubescent; spikelets hairy. (Mus. Berol.)  $\frac{1}{2}$  nat. size.

barium, and these do not represent anything but our common *P. dichotomum* L. as it occurs in the vicinity of Washington, D. C.

**Panicum laxiflorum** Lam. (Fig. 7.) The figured specimen was collected by Beyrich, “in fruticetis Carolinae” (1834). It is very different from Curtiss's North American Plants, No. 3597, distributed under that name.

**Panicum fragile** Kth. Only one specimen, representing a young but typical *P.*

*autumnale* Bosc., labeled *P. divergens* Ell., collected by Beyrich "ad marginem agrorum Carolinæ."

**Panicum consanguineum** Kth. None of Kunth's own specimens are represented, only a few from Curtiss's N. Am. Pl., No. 3583.

**Panicum ciliatifolium** Kth. (Fig. 8.) The figured specimen was collected by Engelmann in North America, and labeled *P. ciliatum* Eng. Specimens from Carolina collected by Beyrich agree with these, but all the specimens are entirely different from *P. leucoblepharum*.

**Panicum nitidum** Lam. A chaos of species and varieties are named "nitidum," or at least are placed in the same species cover. The following are to be found: *P. commutatum* Schult.; typical speci-

mens from Guatemala, but by Vasey identified as *nitidum*. *P. ramulosum* Michx.; collected in Florida by Cabanis.

Specimens from Carolina by Beyrich agree with the smooth form I have collected in Brookland, D. C.

The specimens in Nees ab Esenbeck's herbarium represent the common, hairy form, which I have found in Brookland, D. C. These specimens of N. ab Esenbeck are from New Orleans, and are labeled: "*P. nitidum* var. *villosum*; *P. pubescens* Lam.; *P. villosum* Ell."

There are also in the same species cover (*nitidum*) a few specimens which are named *P. schlechtendalii* Klotzsch—*P. acuminatum* Schlecht. from Caracas, collected by E. Otto. This *P. acuminatum* looks like a small *P. commutatum* Schult., the entire plant and the spikelets smaller. There is also a specimen of *P. pubescens* Michx. from the Antilles which is more hairy than the above-mentioned *P. acuminatum*. They are very likely identical, and represent perhaps forms of the Brookland, D. C., *P. nitidum*, although *P. acuminatum* in some respects resembles a dwarf *commutatum*. From Kunth's own herbarium there is a specimen labeled *P. schlechtendalii*, but this is the *sphaerocarpon* like the one that grows on Bunker Hill, District of Columbia.

**Panicum barbulatum** Michx. There are several individuals so named in the

Herbarium Berolinense, but they represent more than one species. Engelmann has collected some of the specimens, which are all *sphaerocarpon*, and on the label Elliott has written that the plant might be *sphaerocarpon*. Cabanis has a specimen of *laxiflorum*, named *sphaerocarpon*. Beyrich has the common form of *dichotomum*, the same as occurs in Brookland, D. C., the pale form with hairy nodes that grows in shade. But Beyrich also has some true *sphaerocarpon* specimens which are labeled *barbulatum*. According to the Herbarium of Willdenow, the true *barbulatum* Lam. is nothing but the autumnal stage of *P. dichotomum* L.

**Panicum coloratum** L. This plant resembles *P. proliferum*, but the specimens from

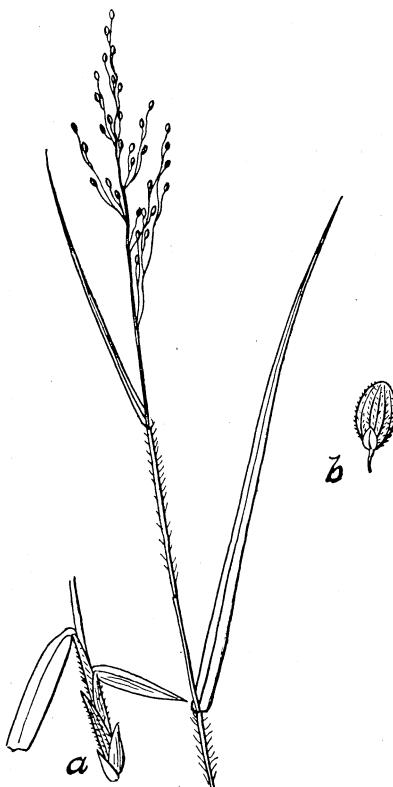


FIG. 11.—"Panicum oligoanthes Schult., *P. rafinesquianum* Schult. N. ab Esenb. in Herb. Lindl. New Orleans." Spikelets downy; leaf sheaths hairy. Plant about 18 inches high. (Mus. Berol.)

Egypt, Africa, and Australia are all very different. A variety of *P. glaucum* from Africa looks like *P. hians*, but the rhizome is woody and covered with inflated, downy sheaths.

**Panicum melicarium** Michx. This is *P. hians* Elliott. Some specimens are labeled *P. milioides* Lam. and Nees ab Esenb.; also *P. miliare*, the last from New Orleans.

**Panicum fuscum** Sw. A large plant with long and broad leaves. The spikelets are obtuse, chestnut-colored and arranged on the lower face of the long branches. The panicle is rather contracted, something like that of Professor Scribner's specimen of *P. agrostoides*. Identical with *P. fuscum* are *P. fasciculatum* Swtz., and *P. fusco-rubrum* or *P. fusco-rubens* of Lam.

**Panicum cognatum** Schult. There is only one specimen named *P. divergens* Ell., but supposed to be identical with *P. cognatum*, and this specimen represents a true *P. autumnale* Bosc.



FIG. 12.—“*Panicum barbulatum* Lam. *P. pubescens* Mx.?” (Willd. Herb. in Mus. Berol.)

men is the autumnal stage of some narrow-leaved *Panicum*; but which?

**Panicum enslini** Trin. This specimen, a very young one, is a foot high and resembles *P. nitidum* from Brookland, D. C. It was collected in “*Carolina australis*” and is from Hooker's herbarium. On the label “*P. pubescens*” is written.

**Panicum lanuginosum** Ell. This species can not be determined from the herbarium material, since the cover contains more than one species. They are the following:

*P. pubescens* Lam. A true *P. sphaerocarpon*, but out of flower, from Mexico.

*P. pubescens* Michx. A low, hairy plant, somewhat like *P. ciliatifolium*.

*P. acuminatum*; *P. pubescens* Michx. agrees with this and resembles *P. ciliatifolium*.

**Panicum latifolium** L. Some of the specimens are labeled “*P. walteri* Poir.” but none of them differ from the typical *P. latifolium*. One specimen is named *P. boscii* Poir., but this seems only to be a small form of *latifolium* L. It is from Herb. Desf., New York.

**Panicum ensifolium** Ell. From New Orleans is *P. microcarpon* Muhl. Some others are from Engelmann's herbarium, but are only small individuals of *P. microcarpon*.

**Panicum agrostoides** Muhlbg. This is united with *P. agrostidiforme* of Lam. Some are labeled *P. agrostoides* Sprgl., but these latter are *P. elongatum* of Pursh.

**Panicum scorpiarium** Lam. Beyrich's specimens agree with those of Professor Scribner.

**Panicum microcarpon** Muhlbg. A few specimens from Curtiss's North American Plants, No. 3599; these are, however, very different from the form I have found in Brookland, D. C., having very short and narrow leaves. They seem rather to belong to a form of *P. sphaerocarpon*.

**Panicum setaceum** Muhlbg. (Fig. 9.) The specimen is from Hooker's herbarium and is labeled “*Panici ramulosi* var.?” The leaves are rather rigid, involute, and ciliate, with hairy sheaths; otherwise the plant is smooth. There is no doubt that this speci-

*P. lanuginosum* Ell., collected by Drummond, is a form of *P. dichotomum* L. (of Brookland, D. C.).

*P. nitidum* var., which is also *P. dichotomum* (the Brookland, D. C., form).

**Panicum hydropophilum** Trin. Specimens from Brazil, collected by Riedel, look like *P. agrostoides*, but the spikelets are still smaller and the leaves only an inch and a half in length.

**Panicum cartilagineum** Muhlbg. (Fig. 10.) One individual with three flowering stems from Hooker's herbarium, collected at New Orleans. The basal leaves are long and acute, the spikelets dark purple and hairy.

**Panicum rafinesquianum** Schult. (Fig. 11.) There are two specimens from Nees ab Esenbeck in the herbarium of Lindley, one of which I have drawn. The basal leaves are broad and short, the upper ones, on the contrary, long and linear; the panicle is somewhat narrow and resembles that of *P. depauperatum*, but the spikelets of *rafinesquianum* are smaller. The plant is nearly smooth, excepting the hairy sheaths and downy spikelets; the glumes are obtuse and distinctly 7-nerved. On the label is written "*P. oligosanthes* Schult. Mant. = *P. rafinesquianum* Schult." There is, however, another specimen from Alabama from Hooker's herbarium, which is labeled "*P. oligosanthes* Schult. var. *ramosum*," and this specimen is much branched, especially from the base, by which it reminds one more of *P. depauperatum* than of the Nees ab Esenbeck specimens. I think that *P. rafinesquianum* is well distinguished from *P. depauperatum*.

#### PANICUMS IN THE HERBARIUM OF WILDENOW.

**Panicum barbulatum** Lam. (Fig. 12.) This is also labeled *P. pubescens* Michx. The specimen is only the autumnal stage of *P. dichotomum*.

**Panicum laxiflorum** Lam. (Fig. 13.) A young specimen with the spikelets, leaves, and sheaths minutely downy. On the label is also written "*P. heterophyllum* (W.)."

**Panicum agrostoides** Muhlbg. This is our *P. elongatum* Pursh. Willdenow has added on the label "*P. rigidulum* Bosc."

**Panicum latifolium** L. This is our typical species, but collected in the autumnal stage. It is also labeled "*P. walteri* Poir." and "*P. scoparium* Michx."

**Panicum pauciflorum** Bch. (probably Bischoff). (Fig. 14.) This is the autumnal stage of a narrow-leaved *Panicum*, perhaps *nitidum*. The glumes are downy, the leaves ciliate and the sheaths hairy.

**Panicum clandestinum** L. This is a few-flowered specimen of the autumnal stage, with the inflorescence concealed in the sheath.

**Panicum rostratum** (W.). This is our *P. anceps*.

**Panicum dichotomum**. This specimen from Virginia is our common form, but the autumnal stage with the spikelets dropped off the main inflorescence, and with a profuse development of lateral shoots with few-flowered inflorescences.

**Panicum heterophyllum** W. This specimen sent by Muhlenberg from North America is a typical *dichotomum* L., the form that is so common in Brookland, D. C.

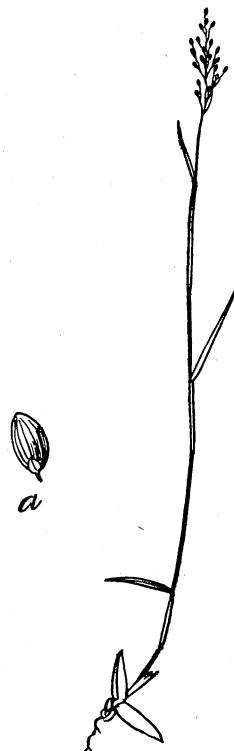


FIG. 13.—"*Panicum heterophyllum* (W.) *P. laxiflorum* Lam. an Spr.?" Leaves, sheaths, and spikelets minutely downy. (Willd. Herb., Mus. Berol.)

**Panicum tectum.** (Fig. 15.) This specimen is labeled "*P. pubescens* Michx. var." and was collected by Muhlenberg in North America. The obtuse spikelets villous-pubescent, the leaves ciliate with hairy sheaths; the nodes have long retrorse hairs.



FIG. 14.—“*Panicum pauciflorum* Bosc. ? Bischoff.  
*P. depauperatum* Muhl.” Sheaths pilose, leaves  
and spikelets downy. (Willd. Herb., Mus. Berol.)



FIG. 15.—“*Panicum pubescens* Mx. Mu-  
hlenberg misit. Amer. borealis.” Spike-  
lets villous pubescent, sheaths hairy,  
leaves ciliate. (Willd. Herb., Mus.  
Berol.)  $\frac{1}{2}$  nat. size.

**Panicum striatum.** A specimen from North America is like the *P. nitidum* form with rather long leaves, from Brookland, D. C.

**Panicum coloratum.** This is our *P. virgatum*.

**Panicum depauperatum.** This is our typical form.

#### RÉSUMÉ.

##### *Panicum*:

<i>fuscum</i> Sw.....	<i>fasciculatum</i> Sw. fusco-rubens Lam. fusco-rubrum Lam.
<i>agrostoides</i> Muhlbg.....	<i>agrostidiforme</i> Lam.
<i>elongatum</i> Pursh.....	<i>agrostoides</i> Sprgl. <i>rigidulum</i> Bosc. <i>agrostoides</i> Muhlbg. fide Willdenow.
<i>autumnale</i> Bosc.....	<i>fragile</i> Kth. <i>divergens</i> Ell.
<i>pauciflorum</i> Ell.....	<i>cognatum</i> Schult. <i>leucoblepharum</i> Trin.
<i>dichotomum</i> L.....	<i>nodiflorum</i> Lam. <i>barbulatum</i> Michx. <i>barbulatum</i> Lam. <i>pubescens</i> Michx. <i>heterophyllum</i> W. (Muhlbg.) <i>lanuginosum</i> Ell.

	{	nitidum var. villosum.
		pubescens Lam.
		vilosum Ell.
<i>nitidum</i> Lam .....		pubescens Michx.
		acuminatum Schlecht.
		schlechtendalii Kltzh.
		striatum (W.).
		enslini Trin. ?
<i>rafinesquianum</i> Schultt .....		oligosanthes Schultes.
<i>ramulosum</i> Michx .....	{	setaceum Muhlbg.
		cartilagineum Muhlbg.
<i>latifolium</i> L .....	{	walteri Poir.
		scoparium Michx. fide Willdenow.
		melicarium Michx.
<i>hians</i> Ell .....	{	milioides Lam. et N. ab Es.
		miliare.
<i>microcarpon</i> Muhlbg .....		ensifolium Ell.
<i>anceps</i> .....		rostratum (W.).
<i>virgatum</i> .....		coloratum in the Willdenow Herbarium.

## V. NATIVE AND INTRODUCED SPECIES OF THE GENERA HORDEUM AND AGROPYRON.

By F. LAMSON-SCRIBNER and JARED G. SMITH.

### HORDEUM.

#### *Analytical key to the species.*

1. Lateral spikelets sessile; species cultivated for the grain .....	<i>H. vulgare.</i>
1. Lateral spikelets not sessile .....	2
2. Floret of the central spikelet sessile .....	3
2. Floret of the central spikelet not sessile .....	9
3. Empty glumes all alike, subulate .....	4
3. Empty glumes not all subulate .....	7
4. Empty glumes 1 to 2½ inches long; lateral florets long-awned .....	<i>H. jubatum.</i>
4. Empty glumes less than 1 inch long; lateral florets merely subulate-pointed, not awned .....	5
5. Lateral spikelets flower-bearing .....	<i>H. boreale.</i>
5. Lateral spikelets neutral .....	6
6. Leaves pungent-pointed; flowering glume of the central spikelet 4½ to 5 lines long, its awn 10 to 12 lines long .....	<i>H. adscendens.</i>
6. Flowering glume of the central spikelet 3 to 4 lines long; its awn about the same length .....	<i>H. nodosum.</i>
7. Empty glumes of the middle spikelet lanceolate .....	<i>H. pusillum.</i>
7. Empty glumes of the middle spikelet setaceous .....	8
8. Inner empty glumes of the lateral spikelets obliquely lanceolate, one-half line wide .....	<i>H. maritimum.</i>
8. Inner empty glumes of the lateral spikelets slightly flattened, one-fourth line wide .....	<i>H. gussoneanum.</i>
9. Empty glumes of the central spikelet and the inner ones of the lateral spikelets ciliate along the margins with spreading hairs .....	<i>H. murinum.</i>
9. Empty glumes not ciliate .....	<i>H. montanense.</i>

**Hordeum jubatum** Linn. Sp. Pl. 85. In the West this grass causes much loss of stock on account of the injury the bearded joints of the spike cause to the mouth and throat of animals eating it in pastures or in hay. Common along the coast and in saline or cold, wet meadows of the interior.

**Hordeum maritimum** With. Arrang., 172. This species is distinguished from *H. nodosum* by the broadened inner empty glume of the lateral spikelets, which are sometimes staminate and distinctly awned. The spikes are also shorter and proportionately thicker. A native of the seacoast of western and southern Europe. Found on the seashores and in sandy sterile soils from Washington to Lower California.

**Hordeum murinum** Linn. Sp. Pl. 85. This species is at once distinguished by the ciliate, flattened, empty glumes of the central spikelets of each cluster and the inner glumes of each of the lateral spikelets. Naturalized near the coast from British Columbia to Lower California.

**Hordeum pusillum** Nutt. Gen. 1, 87. (*H. riehlii* Steud. Syn. Pl. Gram., 353.) Separated from *H. nodosum*, with which it has been confounded, by the dilated inner empty glumes of the lateral florets and the lanceolate empty glumes of the middle flower. Arid and saline or alkaline soils from Idaho and Utah to Arizona and eastward to Louisiana, Missouri, Illinois, Virginia, and South Carolina.

**Hordeum adscendens** HBK. A rather slender, erect, leafy annual (?) 2 to 3 feet high, with terminal bearded spikes 3 to 4 inches long. Culms terete, smooth, shining; nodes smooth, or the lower ones minutely puberulent; sheaths shorter than the internodes, the lower ones densely pubescent, the upper smooth, striate; ligule membranous, rounded, entire, about 1 line long; leaf blades rather rigid, 3 to 6 inches long, 2 to 3 lines wide, striate, scabrous, gradually narrowed to the pungently tipped apex. Axis of the spike compressed, scabrous or subciliate on the margins, the joints about 1 line long. Empty glumes setaceous, rounded on the back, sulcate on the inner face below, scabrous, those of the central spikelet about 1 inch long, those of the lateral spikelets a little shorter; flowering glume of the central spikelet 4½ to 5 lines long, lanceolate, smooth excepting near the apex, awned, awn 10 to 12 lines long, scabrous; palea about as long as the glume, scabrous on the keel above. Prolongation of the rachilla awn-like, and two-thirds as long as the palea. Lateral spikelets neutral, the pedicellate third glume about 3 to 3½ lines long, scabrous, subulate-pointed.—HBK., Nov. Gen. 1, 180. Distinguished from *H. nodosum* by its taller habit of growth, attenuate and pungently pointed leaves, longer spikes and longer-awned glumes, the empty ones being flattened or sulcate on the inner face and not terete throughout. Abundant along irrigation ditches near Glendale, Ariz. No. 2522 C. R. Orcutt, April 30, 1896.

**Hordeum nodosum** Linn. Sp. Pl. 126 (1762). This is an annual or perennial grass, similar in habit to *H. pusillum*, but is usually more erect and taller, and the empty glumes are not at all flattened or dilated above the base. In the Rocky Mountain region from Arizona to Montana and westward to northern California and Washington, and northward to Alaska.

**Hordeum nodosum depressum** Scribn. & Smith, var. nov. Low, 4 to 10 inches high, with shorter pubescent leaves, which are rounded at the base, and inflated upper leaf sheaths; empty glumes 9 lines long; fertile flowering glume narrower than in the species, with an awn as long as itself. In habit resembling *H. maritimum*, but with longer (1 to 2 inches) spikes, and with the details of spikelets those of *H. nodosum*.

**Hordeum gussoneanum** Parl. Pl. Palerm. in obs., 244. Slender ascending annuals 6 to 10 inches high, with the habit of *H. maritimum*, but the inner empty glumes narrowly flattened instead of wing-margined along the inner side. California to Oregon.

**Hordeum boreale** Scribn. & Smith, sp. nov. A slender, erect, and apparently perennial species, with rather broad, flat leaves, very smooth culms, and terminal spikes 3 to 4 inches long. Sheaths shorter than the internodes, the lower ones pubescent, the upper smooth and striate; ligule very short, scarious; leaf blades 4 to 6 inches long, 2 to 4 lines wide, scabrous, long acuminate pointed, those of

the innovations narrower and 6 to 9 inches long. Axis of the spike flattened, scabrous or subciliate along the edges, joints about 1 line long. Empty glumes setaceous and awn-like, subequal, 7 to 9 lines long, those of the lateral spikelets slightly exceeding the others; flowering glume of the central spikelets sessile, 5 lines long, broadly lanceolate, scabrous toward the apex, smooth below, awned; awn about 5 lines long; palea about as long as the glume, scabrous on the keels above, prolongation of the rachilla bristle-like, one-third to two-thirds as long as the palea. Flowering glume of the lateral spikelets pedicellate, about 3 lines long, lanceolate, subulate-pointed or short-awned; palea a little shorter than the glumes; usually there is a bristle-like prolongation of the rachilla behind the palea. The lateral spikelets are perfect, staminate or neuter, and are raised on curved pedicels nearly three-fourths of a line long.

Differs from *H. montanense*, to which it is most closely allied, in the shorter joints of the axis of the spike, longer pedicels, and the lateral spikelets and setaceous, awn-like, empty glumes. Taller and more erect than *H. nodosum*, with broader leaves, longer spikes, and more completely developed lateral spikelets. Aleutian Islands and Alaska to Oregon and California.

**Hordeum montanense** Scribn. in Beal, *Grasses N. Am.*, II, 644. An erect leafy biennial or perennial 2 to 3 feet high, with smooth culms, scabrous leaves, and terminal spikes 2 to 3 inches long. Culms smooth and shining, glaucous at the nodes, sheaths shorter than the internodes, striate, smooth, or the lowermost sparingly pubescent; ligule very short, scarious; leaf blade 2 to 4 inches long, 2 to 3 lines wide, sharply acuminate pointed and somewhat pungent at the tips, with a distinct cartilaginous line along the margins. Empty glumes all alike, linear-lanceolate, scabrous on the back, 6 to 10 lines long, including the slender and scabrous awns. Central spikelet of each cluster, usually 2-flowered, the prolongation of the rachilla above the second flower sometimes tipped with the rudimentary glume, the first floret raised slightly above the empty glumes on a short stipe; the first flowering glume about 5 lines long, lanceolate, scabrous near the apex, awned; awn 8 to 9 lines long, the second floret raised upon a slender internode of the rachilla, which is 1 to 1½ lines long, the glume with its awn 6 to 7 lines long. Lateral spikelets nearly sessile, 2-flowered, similar to the central spikelet, excepting that the second floret is reduced to a small subulate-pointed glume about 2 lines in length.—Montana, No. 430, Scribner (1883).

At once distinguished from *H. boreale* by having the lateral spikelets nearly sessile, and the first floret of the central spikelet raised upon a short stipe.

#### AGropyron.

##### *Analytical key to the species.*

1. Cæspitose, the innovations intravaginal.	2
1. Stoloniferous, the innovations extravaginal.	12
2. Rachis of the spike breaking up at maturity, the joints falling with the spikelet.	<i>A. scribneri</i> .
2. Rachis of the spike continuous.	3
3. Spikelets strongly compressed, remote on the rachis.	4
3. Spikelets subterete, approximate on the rachis.	8
4. Empty glumes more than half as long as the spikelets or equaling them.	5
4. Empty glumes half as long as the spikelet or less.	6
5. Flowering glume awnless or with a short, straight, slender awn.	<i>A. parishi</i> .
5. Flowering glume with a stout divergent or flexuose awn, equaling or longer than the spikelet.	<i>A. scabrum</i> .
6. Spikelets erect.	<i>A. vaseyi</i> .
6. Spikelets divergent.	7

7. Culm leaves 6 or 7, empty glumes acuminate or awn pointed..... *A. arizonicum*.  
 7. Culm leaves 3 or 4, empty glumes acute or obtuse..... *A. divergens*.  
 8. Basal culm leaves shorter than the upper..... *A. gmelini*.  
 8. Basal culm leaves longer than the upper..... 9  
 9. Flowering glumes long awned..... 10  
 9. Flowering glumes awnless or short awned..... 11  
 10. Culms stout, erect; spikes erect..... *A. richardsoni*.  
 10. Culms more or less geniculate, ascending; spikes nodding..... *A. caninum*.  
 11. Spikes stont, 1 to 3 inches long, empty and flowering glumes broadest above  
the middle..... *A. violaceum*.  
 11. Spikes slender, 2 to 8 inches long, empty and flowering glumes broadest below  
the middle..... *A. tenerum*.  
 12. Empty glumes 9- to 11-nerved..... *A. junceum*.  
 12. Empty glumes 3- to 7-nerved..... 13  
 13. Apex of the flowering glume obtuse or truncate..... 14  
 13. Apex of the flowering glume acute or acuminate..... 15  
 14. Culms geniculate, empty glumes one-fourth shorter than the spikelet. *A. campestre*.  
 14. Culms erect, empty glumes half as long as the spikelet, truncate or ob-  
lique..... *A. glaucum*.  
 15. Spikes distinctly 4-angled, rachis articulated..... *A. tetrastachys*.  
 15. Spike not distinctly 4-angled, rachis continuous..... 16  
 16. Flowering glume with a geniculate divergent awn..... *A. albicans*.  
 16. Flowering glume with a straight awn or awnless..... 17  
 17. Spikelets compressed, ovate, acute, diverging..... *A. spicatum*.  
 17. Spikelets narrow, subcompressed, or subcylindrical acute or obtuse..... 18  
 18. Flowering glumes densely pubescent or lanate..... *A. dasystachyum*.  
 18. Flowering glumes smooth or scabrous..... 19  
 19. Leaves flat, smooth on the back; pilose along the nerves above..... *A. repens*.  
 19. Leaves becoming involute, scabrous on the back..... 20  
 20. Leaves strigose-pubescent above, spike elongated..... *A. lanceolatum*.  
 20. Leaves scabrous above, spike compact..... 21  
 21. Empty glumes less than half as long as the spikelet..... *A. riparium*.  
 21. Empty glumes about equaling the spikelet..... *A. pseudorepens*.

A. *Cespitose*, without creeping rootstocks or stolons.

a. *Rachis of the spike continuous*.

\* *Spikelets strongly compressed, remote*.

† *Empty glumes one-half as long as the spikelet or less*.

**Agropyron divergens** Nees in Steud. Syn. Plant. Gram., 347. This species has been referred by many authors to the Siberian *A. strigosum*; *Triticum strigosum* Lessing, not Boiss.; *Bromus strigosus* Bbrst., and to *Triticum caninum* *gmelini* Griseb. Thurber pointed out in Brewer and Watson's Botany of California (2:324), that it does not agree with *Triticum strigosum*, which has the empty glumes much longer and short-awned, the whole spikelet larger and more scabrous, and the basal leaves shorter than the culm leaves. The Asiatic material in the National and Gray herbaria confirms this conclusion.

Washington and Oregon to Montana, Colorado, and Arizona. Specimens in the National Herbarium from Washington: 1760, 1911, 1912 C. V. Piper, Pullman, 1894; 141 Vasey, 1883, and Cascade Mountains, 1889; 2135, 2136, 2140 Henderson, 1892; and 180 Suksdorf, 1885. Oregon: Spalding; Howell, 1881; 124, 151 Leiberg, 1894. California: Wilkes' Exploring Expedition. Nevada: 1332 S. Watson, 1868. Utah: 729 L. F. Ward, East Humboldt Mountains; and 1332 S. Watson, 1869, Black Rock. Idaho: Ainslee, 1874; 481, 559 Sandberg, Heller, and MacDougal, 1892; 2821 Henderson, 1894; 3702 Henderson, 1895; 2064 Rydberg, 1895. Montana: 423 Scribner, 1883; 330, 326, 472, 474, 559 Shear, 1895; 2103, 2110 Rydberg, 1895. Colorado: E. Hall, 1868; 83 Letterman, 1885. Arizona: J. G. Lemmon, 1882.

**Agropyron divergens inermis** Scribn. & Smith, var. nov. Empty glumes unequal, narrowly lanceolate, acute, 4 to 6 lines long; flowering glumes 5 to 6 lines long, smooth, flattened on the back, acute or acuminate, awnless or tipped with a straight or spreading, but not divergent, awn shorter than the glume. Distinguished from the species by its more slender and more densely cæspitose culms, setaceous-convolute leaves, and muticous or short-awned flowering glumes; after flowering the spikelets very soon break up.

British Columbia to Utah and Idaho. Specimens in the National Herbarium from British Columbia: 98a John Macoun, Yale, 1889, Columbia Valley, July 10, 1885. Washington: 1913, 1914, 1915, 1916 Piper, 1894; Sandberg and Leiberg, 237, 1893. Idaho: 179 and 704 Sandberg, Heller and MacDougal, 1892; 2819, 2820, 2822, 2823 Henderson, 1894; 3058 Henderson, 1895. Utah: 361 Tracy, 1887, Ogden. There is also a single specimen, 469 Rydberg, 1891, collected in Banner County, Nebr., and distributed as *Agropyron tenerum* var., which differs only in having the bases of the culms clothed with dead leaf sheaths. There are also two specimens from Washington, Dr. Vasey, Cascade Mountains, 1889, and 1166 Suksdorf, 1889, which apparently connect this variety and the species. The spikelets are very much compressed, and the culm leaves are from 8 to 12 inches long.

**Agropyron divergens tenuispicum** Scribn. & Smith, var. nov. Culms 2 to 3 feet high; culm leaves 2 to 5 inches long, flat, becoming involute when dry, those of the innovations one-third as long as the culms and very narrow; spike slender, flexuous, 3 to 6 inches long, of from 8 to 14 erect 3- to 5-flowered spikelets; spikelets 5 to 7 lines long; awns 5 to 9 lines long, slender, flexuous, or divergent. Washington and Oregon to Wyoming and Montana. Specimens in the National Herbarium from Oregon: 181 Howell, 1885. Idaho: 179 and 297 Sandberg, Heller, and MacDougal, 1892. Utah: 158 Ward. Montana: 347 Shear, 1895; 2074, 2147 Rydberg, 1895. Wyoming: 623 Tweedy, 1885, Yellowstone Park.

**Agropyron vaseyi** Scribn. & Smith, sp. nov. Culms rigid, erect, wiry, 1 to 1½ feet high, with short involute setaceous culm leaves, and short, few-flowered interrupted spikes. Culms glabrous or glaucous, striate, terete; nodes glabrous; culm leaves 5 or 6; sheaths striate, glaucous, shorter than the internodes; ligule membranous, very minute; leaf-blades smooth and glaucous on the back, scabrous on the margins, minutely strigose-pubescent above, rigid, erect or ascending, 1 line or less wide, 1 to 3 inches long, those of the innovations 3 to 6 inches long. Spike very slender, 2 to 4 inches long, rigid or somewhat flexuous, of 6 to 8 sub-distinct, 3- to 5-flowered, erect spikelets, 4 to 5 lines long; empty glumes oblanceolate, acute or acuminate, slightly unequal, scarious along the margins, 3 to 4 lines long; flowering glumes 4 lines long, lanceolate-acute and tipped with a stout divergent awn 4 to 5 lines long; palea shorter than its glume, rounded or obtuse.—*Agropyron divergens tenuis* Vasey, in Macoun's Cat. Canad. Plants, vol. 4, p. 242, without description, not *A. tenerum* Vasey; *Triticum agilo-poides* Thurb., not *Turcz.*, in Gray, Proc. Phila. Acad., p. 79 (1863); *Triticum caninum* var.  $\beta$  Hook. Fl. Bor. Am., 2:255.

This species is readily separated from *A. divergens*, with which it has been previously placed, by its shorter and narrower leaves, rigid and more wiry culms and fewer spikelets which are smaller in every way. Oregon and Washington to Wyoming and Colorado. Specimens in the National Herbarium from Washington: 2132 Henderson, 1892, distributed as *A. tenerum*. Oregon: Henderson, 1884, Hood River Station. Montana: 461 S. Watson, 1880; 2164, 2299, 2301, 2356, Rydberg, 1895. Wyoming: 44 and 45 Letterman, 1884; Burglehaus, 1893; Evermann, 1893. Colorado: J. Wolfe, 1873.

**Agropyron arizonicum** Scribn. & Smith, sp. nov. Glaucous, 1½ to 2 feet high, with flat, soft leaves. Culms glabrous or minutely scabrous below, cylindrical, striate, clothed at the base with papery leaf sheaths. Culm leaves 6 to 7. Sheaths longer than the internodes, open at the throat, sparsely hairy; ligule short,

membranous; leaf blade linear, attenuate-pointed, 5 to 9 inches long, 3 lines wide or less, smooth below, scabrous on the margins, strigose-pubescent above, those of the innovations 9 to 14 inches long; spike nodding, 5 to 9 inches long, of seven to fourteen 5- to 7-flowered spikelets, 9 to 12 lines long; empty glumes narrowly lanceolate, acuminate or short-awned or unequally bidentate, about equal, 3- to 5-nerved, half or less than half as long as the spikelet; flowering glumes linear lanceolate, 5 to 7 lines long, acuminate, scabrous, tipped with a stout, scabrous, divergent awn, about 1 inch long; internodes of the rachilla 1½ lines long, slender, glabrous; palea shorter than its glume, acute. This species is distinguished from *A. divergens*, to which it has been referred, by its more numerous, longer, and broader culm leaves, more flexuous spike, stouter awns, and by the very acute empty glumes.

In the mountains of New Mexico, Arizona, and Chihuahua. Specimens in the National Herbarium from New Mexico: 3174 Lemmon, 1884, near Laguna. Arizona: 67 Nealley, 1891, Rincon Mountains; 2929 Lemmon, 1882, Huachuca Mountains; Dr. Wilcox, 1894, Fort Huachuca. Rocky Mountains: C. V. Riley, without date or locality. Chihuahua: 1439 Pringle, 1887, Sierra Madre. Also collected in the Organ Mountains by Bigelow, 1851 (Gray Herb.).

† *Empty glumes two-thirds as long as the spikelet or equaling it.*

**Agropyron parishii** Scribn. & Smith, sp. nov. Culms 2 to 3½ feet high, with flat leaves and erect or nodding spikes 6 to 12 inches long. Culms cylindrical, glabrous, striate, or smooth and shining below; nodes tumid, retrorsely pubescent; leaf sheaths striate, pubescent below, and sparingly ciliate along the margins, the basal ones shorter, the upper longer than the internodes; ligule membranous, very short; leaf blade constricted at the base, smooth on the back, scabrous above and on the margins, 2 to 3 lines wide, linear attenuate to the acute apex, the lower culm leaves 6 to 9 inches, and the uppermost 1 to 2 inches. Spike of 8 to 12 compressed oblanceolate spikelets. Spikelets 5- to 7-flowered, 8 to 10 lines long, shorter than the internodes of the rachis, which is scabrous on the margins; empty glumes two-thirds as long as the spikelets, nearly equal, linear, acute or acuminate, 5-nerved, scariosus on the margins; flowering glume lanceolate, acute, 4½ to 5½ lines long, flattened on the back below, prominently 5-nerved above, and scabrous toward the minutely 3-toothed awnless or short-awned apex. Awn, when present, straight, slender, 3 to 4 lines long. Internodes of the rachilla 1 line long, minutely pubescent. Palea as long as its glume, acute or obtuse. Represented in the National Herbarium by specimens collected by S. B. Parish in Waterman's Cañon, San Bernardino Mountains, California, at an altitude of 3,000 feet, No. 2054, June 28, 1888, and No. 2238, June 23, 1891.

This species apparently connects *Agropyron* with *Brachypodium*. The habit is similar to that of *A. arizonicum*. It is the only American species with pubescent culm nodes.

**Agropyron parishii** lœve Scribn. & Smith, var. nov. With the habit of the species, but the culm nodes and leaf sheaths glabrous; awns as long as or longer than the flowering glumes. Type in the Gray herbarium No. 414, Dr. Edward Palmer, collected at Fowleys, Cuiamaca Mountains, in the southern part of San Diego County, Cal., 1875.

**Agropyron scabrum** Beauv. A pale glaucous species, 2 to 3 feet high, with flat, rigid, striate leaves, glabrous on the back; sheaths longer than the internodes; spikes 10 to 16 inches long, of 10 to 14 narrow, erect spikelets; empty glumes cartilaginous, 6 to 8 lines long, lanceolate-acuminate, 5-nerved, the margins smooth and shining; flowering glume shorter than the longest empty glume, smooth and shining, tipped with a flexuous or divergent awn 8 to 18 lines long.—Beauv. Agrost., 102. Distinguished from *A. arizonicum*, with which it might be confounded, by its larger, more robust culms, broader leaves, larger spikelets,

larger and firmer empty glumes, and longer awns. It is an Australian grass which has been introduced into some parts of California.

Specimens in the National Herbarium: 6468 Bolander, without date or locality; Miss Norton, San Jose, 1879; and Bolander 1510, in Herb. Gray, ex Thurb., and in Herb. Missouri Botanical Garden.

\* \* *Spikelets subterete, approximate.*

† *Basal culm leaves longer than the upper ones, empty glumes awnless.*

‡ *Flowering glumes long-awned.*

**Agropyron richardsoni** Schrad. (fide Kew Index). *Triticum richardsoni* Trin. in Reliq. Scrad., Linn., 12: 467 (1838), according to a specimen from the St. Petersburg Academy in the Gray Herbarium. *Agropyron unilaterale* Cassidy, Bull. Colo. Expt. Station 12: 63 (1890); *A. caninum unilaterale* Vasey, Contr. U. S. Nat. Herb., 1: 279, not *A. unilaterale* Beauv. Agrost., 102. *A. violascens* Beal, Grass. N. Am., II, 635 (1896).

From the Saskatchewan to the mountains of Colorado. Specimens in the National Herbarium from British Columbia: 103 J. Macoun, 1889, Spencer Bridge; 29 and 33 J. Macoun, 1872, Saskatchewan plains; 117 J. Macoun, 1879, Red Deer Lakes. Minnesota: Ballard, 1893, Cass County. South Dakota: Geyer, 1839, James River; Dudley, 1883. Montana: Scribner, 1883. Nebraska: Bates, 1892. Colorado: Crandall, 1890; 1169, J. Wolfe, 1873; Dr. Vasey, 1884, Pen Gulch and Veta Pass. Specimens in the Gray herbarium, British Columbia: Richardson, type collection; Bourgeau, 1858, Saskatchewan; J. Macoun, 1880, Cypress Hills. Montana: 422 Scribner, 1883. Colorado: E. Hall, 1864; 210 Hall and Harbour, 1862; 881 and 1168 J. Wolfe, 1873, Twin Lakes; 446 E. L. Greene, 1870, high mountains near Golden.

**Agropyron richardsoni ciliatum** Scribn. & Smith, var. nov. Leaf sheaths and leaf blades pilose-pubescent; ligule 1 line long; spikelets 8 lines long; empty glumes 5- to 7-nerved, tipped with an awn as long as the spikelet.

In the Belt Mountains, Montana; altitude, 4,500 feet; F. Lamson-Scribner, July, 1883.

**Agropyron caninum** Beauv. Agrost., p. 102. *Triticum caninum* Linn. *A. caninoides* Beal, Grass. N. Am., II, 640 (1896). Distinguished from *A. repens* by its intravaginal innovations; leaves scabrous on both surfaces; more crowded erect spikelets; long-awned flowering glumes, and nodding spikes. It may be distinguished in the field by its very much brighter green color.

New England States, Nova Scotia, Canada, and westward through the region of the Great Lakes to the Black Hills of South Dakota and the Rocky Mountains. It has also been introduced with European grain and grass seeds quite widely through the Northern and Middle States.

Forms of this, with unilateral spikes, have been referred to *A. richardsoni*, which has awns three or four times as long as those of *caninum*, and the flowering glume bidentate below the origin of the awn. Slender forms have been referred by collectors to *A. tenerum* Vasey, and forms with short compact spikes and short awns to *A. violaceum* Vasey.

**Agropyron caninum pubescens** Scribn. & Smith, var. nov. The leaf sheaths and leaf blades densely clothed with retrorse ciliate pubescence. Collected by John Macoun at Little Sheisemp Lake, British Columbia, No. 99, June 18, 1889.

## *Flowering glumes awnless or short-awned, spikes erect.*

**Agropyron tenerum** Vasey in Coult., Bot. Gaz., 2: 258 (1885). New Mexico and southern California to Washington and British Columbia, and eastward to Colorado, and Nebraska, Minnesota, the White Mountains of Vermont, and New Hampshire and Labrador.

Specimens in the National Herbarium marked *A. violaceum majus* Vasey, belong partly here, and in part to *A. pseudopropens*. *A. violaceum* of many Western collectors also belongs here.

**Agropyron tenerum ciliatum** Scribn. & Smith, var. nov. Sheaths pubescent, or the lowest ones densely hairy. From Minnesota to Nebraska and Utah.

**Agropyron tenerum longifolium** Scribn. & Smith, var. nov. Three to 4 feet high, with smooth and shining rigid culms, long, attenuate-pointed, involute leaves nearly as long as the culm, and slender cylindrical spikes, 6 to 10 inches long; empty and flowering glumes short-awned.

Northern California to British Columbia. Type specimens collected by Thomas Howell, 256 (1887), near Giant's Pass, Oregon. There is also a specimen which was exhibited by the Oregon World's Fair commission, collected in 1892. One sheet of Bolander's 6110, from probably northern California, belongs here.

**Agropyron violaceum** Vasey. Grass. U. S.; Special Rept. Dept. of Agriculture, No. 63, p. 45, 1883. *Triticum violaceum* Hornem., Fl. Dan. t. 2044 (1832). The typical or European form of this species is represented in the National Herbarium by specimens from Grinnell Land, collected by Gen. A. W. Greely in 1883, and from Labrador, Nova Scotia, and the White Mountains. Very closely approaching this, and not sufficiently distinct to be distinguished as a variety, is a form widely distributed in the Rocky Mountains from Colorado to Alaska and northward from the Saskatchewan plains to the Arctic Circle, with more slender culms 1½ to 2½ feet high, and rigid leaves 3 to 7 inches long, becoming convolute when dry, the uppermost leaf blade shorter than its sheath, sometimes very short, those of the innovations often 7 or 8 inches long.

Specimens in the National Herbarium: Grinnell Land, General Greely, 1883. Labrador: 676 Towner and 6071 Low, 1894. New Hampshire: C. Faxon, 1882. Colorado: Crandall, Cameron Pass, 1890. Utah: 77b, 440, 1517 M. E. Jones, 1879, distributed as *Triticum repens* var. *compactum* Vasey; 349 Tracy, 1887; 582 Ward, Aquarius plateau. British Columbia: 71 Macoun, 1872; 97 Rothrock, 1866. Alaska: 88 Dawson, 1887, Yukon River.

**Agropyron violaceum latiglume** Scribn. & Smith, var. nov. Culms 10 to 16 inches high, erect, rigid, wiry. Culm leaves 1 to 2 inches long, glaucous, convolute when dry, linear-lanceolate, acute, hairy on both sides, scabrous on the margins and upper surface, the uppermost leaf one-half to three-fourths inch long. Spikes long exserted, 1 to 2 inches long. Empty glumes oblanceolate, acute, with broad, scarious margins, short-awned or awnless, becoming flat with age; flowering glumes rounded on the back, densely pubescent; leaves of the innovations like those of the culm, 1 to 2 inches long.

From Montana to Alaska. Specimens in the National Herbarium: 1011 Tweedy, 1886, from Lone Mountain, Gallatin County, Mont., and 36 Dawson, 1887, Yukon River, Alaska.

**Agropyron violaceum andinum** Scribn. & Smith, var. nov. Culms geniculate, densely tufted, weak, 8 to 14 inches high. Spike short and compact, 2 to 3 inches long, awns as long as or longer than the flowering glumes. Empty and flowering glumes 4 to 5 lines.

High mountains in Colorado above timber line. No. 720 Jones, 1878, Grays Peak; 35 and 37 Patterson, 1885, Grays Peak; 62 and 104 Letterman, 1885, Kelso Mountain; 392 and 693 Shear, 1895, Grays Peak.

† Basal culm leaves shorter than the upper ones.

**Agropyron gmelini** Scribn. & Smith, sp. nov. Culms 2 to 4 feet high, erect, rather slender, glabrous, cylindrical; nodes brownish; sheaths longer than the internodes, open at the throat, glabrous, shorter than the blades; ligule very short, membranous; culm leaves 4 or 5, the upper ones 5 to 12 inches long, linear, attenuate-pointed, glabrous below, scabrous on the margin and strigose or minutely

scabrous above, the radical leaves 1 to 3 inches long and 2 to 3 lines wide. Spike slender, 4 to 10 inches long, of 10 to 20 spikelets. Spikelets 6 to 9 lines long, 7- to 9-flowered, subterete or compressed; empty glumes unequal, 5 to 7 lines long, oblong-lanceolate, acuminate and short-awned, two-thirds as long as the spikelet; flowering glumes narrowly oblong-lanceolate, acuminate, 5 to 6 lines long, awned from or just below the apex with a slender, divergent, scabrous awn 8 to 15 lines long; palea shorter than its glume; internodes of the rachilla terete, nearly smooth.

This plant agrees with the figure and description of *Triticum caninum gmelini* Griseb. in Ledeb. Icon. Fl. Ross. t. 248. It differs from *A. divergens tenuispicum* in having a more slender spike, awned scabrous empty glumes, upper culm leaves longer than the basal ones, and the spikelets less strongly compressed, and erect. It is closely related to *A. violaceum*.

Washington to western Nebraska. Specimens in the National Herbarium from Washington: 1167 Suksdorf, 1889, Rock Creek. Idaho: 3274 Henderson, 1895, Wood River; 178 Sandberg, Heller, and MacDougal, 1892, Clearwater River; 2327 Rydberg, 1895, Beaver Canyon. Montana: 379 Shear, 1895, Deer Lodge; 2233 Rydberg, 1895, Baldy Peak. Wyoming: 625 Tweedy, 1885, Cache Creek. Nebraska: 1617 Rydberg, 1893, Grant County.

**Agropyron gmelini pringlei** Scribn. & Smith, var. nov. Culms low, tufted, 8 to 12 inches high, geniculate at the base; the leaves 2 to 4 inches long, 1 to 2½ lines wide, rigid, acute, glaucous below, strigose above. Spikes loose, few-flowered; awns of the flowering glumes 1 inch long.

High mountains in Wyoming and California. Specimens from California: Pringle 1882, Sierra Nevada Mountains above Summit Valley. This is, in part, Vasey's type of *A. scribneri*. Wyoming: 234 and 695 J. N. Rose, 1893, mountains in Yellowstone National Park, 10,000 feet, distributed as *A. scribneri*. In the Gray herbarium, from California: 33 J. W. Congdon, Mount Hoffman, Mariposa County, 1890; 2118 Brewer, Carson Pass.

b. *Rachis of the spike breaking up at maturity, the joints falling with the spikelets.*

**Agropyron scribneri** Vasey. Torr. Bull. 10: 128. Above timber line on high mountains from Montana to Arizona. Specimens in the National Herbarium from Montana: 427 Scribner, 1883 (type). Colorado: 4 Patterson, 1875; 162 Patterson, 1885, Grays Peak; 2453 Rydberg, 1895, Grays Peak; 86 and 103 Lemmon, 1884, Pikes Peak; 28 Canby, 1895, Pikes Peak. Arizona: 905 Rusby, 1883, summit of Mount Humphrey.

B. *Culms from creeping rootstocks, not cespitose.*

a. *Empty glumes 9- to 11-nerved.*

**Agropyron junceum megastachyum** Fries. A maritime perennial with geniculate ascending culms one-half to 1½ feet high; long creeping rootstocks; convolute-filiform carinate leaves, and broad flat spikelets. Spikelets obovate, obtuso, 5- to 8-flowered, 1 inch long, 5 to 7 lines wide, rather remote; empty glumes 6 to 8 lines long, cartilaginous, blunt; flowering glume narrower, truncate, mucronate. Rachilla fragile.—Fries. Mant. 3: 12.

Introduced along the coast near San Francisco, Cal., as a sand-binder. Represented in the National Herbarium by specimens collected by J. W. Congdon, Lake Merced, San Francisco, July, 1893.

b. *Empty glumes 3- to 7-nerved.*

\* *Apex of the flowering glume obtuse or truncate.*

**Agropyron campestre** Godr. & Gren., Fl. Fr. 3: 607. Sparingly introduced as a ballast plant at Camden, N. J.

**Agropyron glaucum** Roem. & Schult., Syst. 2: 752. *Triticum glaucum* Desf.; *T. intermedium* Host. Sparingly introduced as a ballast plant, New Jersey and Connecticut.

\*\* *Apex of the flowering glume acute or acuminate.*

† *Spikelets much compressed, distichous in two parallel planes so that the spike is distinctly 4-angled; rachis articulated, breaking up at maturity.*

**Agropyron tetrastachys** Scribn. & Smith, sp. nov. A maritime glaucous species with slender, erect, rigid culms, 2 to 3 feet high, spreading leaves, and pale greenish or straw-colored spikes. Culms striate, smooth; nodes brownish, glabrous; sheaths striate, smooth, shorter than the leaf blades and internodes; ligule obsolete; leaf blades 4 or 5, linear, long, attenuate-pointed, rigid, 6 to 8 inches long, 2 lines or less wide, glabrous on the back, scabrous on the margins, closely striate-nerved and glaucous above, scabrous along the nerves. Spikes long-exserted, 4 or 5 inches long, the rachis 4-angled, glaucous, scabrous on the angles; spikelets 15 to 20, 7- to 11-flowered, 6 to 10 lines long, 3½ to 5 lines wide, parallel to the rachis and overlapping one another; empty glumes about equal, lanceolate, and mucronate pointed, the lower 3-, the upper 5- to 7-nerved, about 5 lines long, carinate toward the apex, smooth, excepting along the keel; flowering glume lanceolate, acute, keeled, mucronate or tipped with a short awn, scabrous above the middle; palea as long as its glume, acute; internodes of the rachilla very short and obconical. Allied to *A. spicatum* (Pursh.).

Sandy beaches, Cape Elizabeth, Me. Specimens in the National Herbarium collected by F. L. Scribner, July 26, 1895. Gray herbarium.—E. Tuckerman, August, 1860, Cape Elizabeth.

†† *Spikes not distinctly 4-angled, rachis continuous.*

‡ *Flowering glume tipped with a geniculate divergent awn.*

**Agropyron albicans** Scribn. & Smith, sp. nov. Stoloniferous perennial with bluish-green leaves and much compressed, pubescent, distant spikelets, with geniculate divergent awns. Culms slender, erect, 1 to 2 feet high, glaucous, clothed at the base with dead leaf sheaths; culm leaves 3 to 4; sheaths glaucous, smooth, shorter than the internodes; ligule very short, membranous; leaf-blade rigid, ascending, linear involute, scabrous throughout, 3 to 5 inches long, 1 to 2 lines wide, those of the sterile shoots glaucous, half as long as the culm; spike long-exserted, slightly nodding, 3 to 4 inches long, of 8 to 10 spikelets; spikelets 5- to 7-flowered, 8 to 9 lines long, distant on the rachis, ascending or erect; empty glumes half to two-thirds as long as the spikelet, indurated at the base, broadly 3- to 5-nerved, pubescent, oblanceolate, acuminate, tipped with an awn 2 to 3 lines long; flowering glumes 4½ lines long; ovate lanceolate, rounded on the back, densely pubescent, tipped with a stout, scabrous, divergent awn 6 to 8 lines long; palea as long as its glume, bidentate; internodes of the rachilla pubescent.—Collected by Mr. P. A. Rydberg at Yogo Gulch, Montana, altitude 5,000 feet (No. 3405), August 22, 1896.

Closely related to *A. dasystachyum* and *A. spicatum molle*, from both of which it is separated by the divergent geniculate awns of the flowering glume. The spike has a whitish aspect, hence the specific name.

† Flowering glume awnless, or with a straight awn.

— Spikelets acute, compressed, diverging, the empty glumes as long as the spikelet.

**Agropyron spicatum** Scribn. & Smith, nom. nov. Glaucous, 1 to 4 feet high, with compressed acute spikelets. Culms rigid, erect, striate, with 3 or 4 leaves and brown nodes. Sheaths striate, smooth, shorter than the internodes; ligule very short, often purplish; blades erect, spreading, rigid, bluish-green, smooth or slightly scabrous on the back, rough-scabrous on the margins and along the prominent nerves above, becoming involute, 4 to 7 inches long, 2 to 3 lines wide, those of the innovations narrower and often half as long as the culms. Spikes exserted, 3 to 7 inches long. Spikelets yellowish-green, one-half to 1 inch long, 7-to 13-flowered, spreading, usually somewhat distant, single or in pairs, lanceolate-acute; empty glumes lanceolate, linear, acuminate or awn-pointed, one-half or two-thirds as long as the spikelets, scabrous on the nerves, slightly unequal, often oblique; flowering glumes 4 to 6 lines long, narrowly lanceolate, acute, acuminate, mucronate, or awn-pointed, rounded on the back, smooth or thinly pubescent; palea a little shorter than its glume, scabrous along the margins above; internodes of the rachilla cylindrical, very minutely scabrous:—*Festuca spicata* Pursh, Fl. Am., Sept., Vol. I, p. 83; *Triticum missouricum* Sprengel Syst. Veg., 325 (1825); *Agropyron glaucum occidentale* Vasey & Scribn. in Macoun's Cat. Can. Pl., 2: 242.

This is *Triticum glaucum* and *Agropyron glaucum* of American authors, not R. & S. Closely related to *A. pseudorepens*, from which it may be distinguished by its rigid, striate-nerved, glaucous and bluish-green leaves, and its yellowish, broader, and more compressed spikelets.—Type in the Engelmann herbarium collected by Geyer, "Upper Missouri."

Common on the prairies and high plains from Minnesota and Manitoba to Missouri and Texas, westward to Utah and eastern Oregon. Specimens from Colorado, Nebraska, and Kansas often have two spikelets at each node; forms with pedicellate spikelets and racemose-spicate forms rarely occur.

**Agropyron spicatum palmeri** Scribn. & Smith, var. nov. Culms robust, clothed at the base with papery leaf sheaths, the whole plant sparsely or densely strigose-pubescent, spikelets more closely appressed.

Mountains of Arizona and New Mexico. Specimens in the National Herbarium from Arizona: Palmer, 1869, without locality, and 563, June, 1890, Willow Spring; 3192 Lemmon, 1884, San Francisco Mountains. New Mexico: 35 Rothrock, June, 1875, Santa Fe, and 103, July, 1874, Agua Azule; altitude, 6,500 feet.

**Agropyron spicatum molle** Scribn. & Smith, var. nov. Like the species, but the empty and flowering glumes and the rachis more or less villose-pubescent. This is *Agropyron glaucum* of many collectors and *A. glaucum pubiflorum* Vasey, in part.

The Saskatchewan to Colorado and New Mexico, and westward to Idaho and Washington, but not so abundant as the species.

— Spikelets erect, narrow, subcompressed or nearly cylindrical.

— Flowering glumes densely pubescent or lanate.

**Agropyron dasystachyum** Scribn. Bull. Torr. Bot. Club 10: 78; *Triticum repens dasystachyum* Hook., Fl. Bor. Am., 2: 254; *T. dasystachyum* A. Gray, Manual, 602 (1848).

Sand hills and dunes from Manitoba to Michigan. Specimens in the National Herbarium from Manitoba: 109, 710 J. Macoun, 1879. Wisconsin: Lapham. Michigan: 56 and 155 Schuette, 1887; Wheeler, 1895.

**Agropyron dasystachyum subvillosum** Scribn. & Smith, n. n. More slender, less glaucous, the innovations one-fourth to one-third as long as the culms; spike

shorter and more crowded, narrow, mostly fewer-flowered. Spikelets shorter, more compressed; empty glumes ovate-lanceolate, acuminate or simply acute, one-third as long as the spikelet; flowering glumes 3 to 5 lines long, obtuse or acute, pubescent or lanate.—*Triticum repens subvillosum* Hook., Fl. Bor. Am., 2: 254; *A. dasystachyum*, collectors, in part.

From the Saskatchewan to Washington, Nevada, and Colorado. Specimens in the National Herbarium from Washington: Vasey, 1889; 2137, 2171 Henderson, 1892; 310 Sandberg and Leiberg, 1893. Idaho: 2341 Rydberg, 1895. Utah: 230 Ward, 1875. Colorado: 15 Patterson, 1885; 631 Shear, 1895. Wyoming: 621 Tweedy, 1885. Montana: 587 Williams, 1890; 549 Shear, 1895; 2130 Rydberg, 1895. Manitoba: 111 J. Macoun, 1879.

==*Flowering glumes smooth or merely scabrous.*

1. *Leaves becoming involute, strigose-pubescent above; spikelets subdistant.*

**Agropyron lanceolatum** Scribn. & Smith, sp. nov. Pale yellowish-green or glaucous, 2 to 3 feet high, with long flat leaves, becoming involute when dry, and narrow, erect, or flexuose spikes of rather large subcompressed, acute spikelets. Culms terete, smooth and shining below, striate above, clothed at the base with papery leaf sheaths; nodes brown or black; sheaths somewhat inflated, shorter than the internodes, the lower finely pubescent, the upper smooth and glaucous; ligule very short, membranaceous; leaf blades linear, acuminate and pungently pointed, 5 to 12 inches long, about 2 lines wide, flat, scabrous on the back and margins, pubescent or thinly hirsute above, the uppermost culm leaf very short. Spike 4 to 6 inches long. Spikelets 5 to 10 lines long, 4- to 7-flowered, erect; empty glumes much shorter than the spikelets, unequal, narrowly lanceolate or oblanceolate, acuminate, 3 to 4½ lines long, 3- to 5-nerved, scabrous on the nerves; flowering glumes 4 to 7 lines long, broadly lanceolate, acute, mucronate, truncate or bidentate, rounded on the back, more or less pubescent, 3-nerved and scabrous toward the apex; palea nearly equaling its glume; internodes of the rachilla short, obconical, pubescent.—*Triticum junceum* Hook. Fl. Bor. Am., 2: 254, not Linn.; *A. glaucum pubiflorum* Vasey, in part. Closely related to *Agropyron spicatum*, from which it is readily distinguished by its short and acute empty glumes, lanceolate acute spikelets, and less crowded spike.

Idaho to Washington and Oregon. Specimens in the National Herbarium from Idaho: 266, 267 E. Palmer, 1893; 2341 Rydberg, 1895. Oregon: 1133 Cusick; 269, 302 Leiberg, 1894, Crook County. Washington: Vasey, 1889; Sandberg and Leiberg, 1893; and Suksdorf as follows: 18 (1882), distributed as *Triticum repens acutum* Vasey; 179 (1885), distributed as *A. repens* var.; 222, 914 (1886), distributed as *A. glaucum pubiflorum* Vasey.

2. *Leaves becoming involute, scabrous throughout, spikelets crowded.*

× *Empty glumes about as long as the spikelet.*

**Agropyron pseudorepens** Scribn. & Smith, sp. nov. An indigenous perennial with creeping rootstocks, light-green leaves, scabrous on both sides, and narrowly lanceolate erect spikelets in an elongated spike. Culms 1 to 3 feet high, ascending or erect from a geniculate base, striate, glabrous, or scabrous below the nodes, with 3 or 4 culm leaves. Leaf sheaths striate, glabrous, shorter than the internodes; ligule membranous, 1 line long or less; blades linear, long-attenuate pointed, scabrous throughout, 5 to 8 inches long, 1 to 3 lines wide, prominently striate-nerved, involute when dry. Innovations half the length of the culm. Spikes 4 to 8 inches long. Spikelets 5 to 8 lines long, erect and appressed before and after flowering, linear-lanceolate, acute, compressed, 3- to 7-flowered, subdistant; empty glumes linear-lanceolate, nearly equal, acuminate or awn-pointed, 5-nerved, a little shorter than or equaling the spikelet, scabrous on the nerves

and scarious on the margins; flowering glumes linear-oblong, acuminate or awn-pointed, rounded on the back, 5-nerved, scabrous; palea shorter than its glume; internodes of the rachilla short, minutely scabrous.

This is *Agropyron repens* of most American collectors and manuals, but not of Linnaeus. The latter is European, and is not found indigenous in this country except along the New England coast. *A. pseudorepens* may be distinguished by the harsher leaves, which are scabrous on both sides, more prominently nerved, and involute when dry; the longer, narrower, and more rigid leaves of the innovations, and narrower and more erect spikelets; the flowering glumes very rarely awned.

Texas and Arizona to Nebraska, Montana, and British Columbia. Specimens in the National Herbarium from Texas; Nealey, 1889. Arizona: 3193 Lemmon, 1884. Colorado: G. H. French, Lake Ranch, 1874, *Triticum repens compactum* Vasey, in part, and *Triticum repens acutum* Vasey, in part; 1166 J. Wolfe, 1873; 437 M. E. Jones, 1878, *Triticum repens acutum* Vasey, in part; 120 C. S. Crandall, July, 1890; 15 Patterson, 1885; 2488 Rydberg, 1895; 621, 649, 733 Shear, August, 1895. Wyoming: B. W. Evermann, Casper, 1893; 224 J. N. Rose, Yellowstone Park, 1893. Nebraska: 110, 111, H. J. Webber, 1889; 2603 Clements, June, 1893; 272 Shear, Kearney, 1895; 2018 Rydberg, Kearney, 1895. South Dakota: Geyer, 1839. North Dakota: Seymour, 1884. Minnesota: F. L. Wood, July, 1889. Ontario: John Macoun, July, 1884. British Columbia: 10 John Macoun, 1890, Deer Park. Montana: 424 F. L. Scribner, 1893; L. F. Ward, 1885; 340, 383, 411, 440 Shear, 1895; 2088 Rydberg, 1895. Nevada: 236, S. M. Tracy, 1887. Washington: 2134 Henderson, July, 1892; 1910, Piper, July, 1894.

**Agropyron pseudorepens magnum** Scribn. & Smith, var. nov. Robust, 3 to 4 feet high; leaves 8 to 12 inches long; spikes 6 to 8 inches long, one-sided; spikelets crowded, acute, 1 inch long.

Type specimen collected by P. A. Rydberg, 2401, Enterprise, Colo., August 19, 1895; also by Sandberg, Leiberg, and MacDougal, 556, south shore of Lake Cœur d'Alene, Idaho, July 5, 1892. Possibly a good species.

× × *Empty glumes less than one-half as long as the spikelets.*

**Agropyron riparium** Scribn. & Smith, sp. nov. Glaucous, tufted, 1½ to 2 feet high, with narrowly involute leaves and pubescent leaf sheaths, short crowded spikes, and 3-nerved empty glumes. Culms terete, striate, glabrous, erect from a somewhat geniculate base; sheaths striate, much shorter than the internodes, the upper glabrous, the lower minutely pubescent; ligule very short, membranous; leaf blades linear, long-attenuate pointed, flat, becoming involute, 2 to 6 inches long, 2 lines wide or less, striate, scabrous throughout. Spike 2½ to 4 inches long, of 8 to 15 rather crowded 5- to 7-flowered, compressed, and spreading spikelets which are 5 to 6 lines long; empty glumes oblong-linear, acute, 3-nerved, 2 lines long; flowering glume oblong-lanceolate, acute, glaucous, rounded on the back, scabrous toward the apex; palea shorter than its glume; internodes of the rachilla glabrous, flattened, about 1 line long.

River banks, Montana, June and July. Founded on specimens collected in 1895 by P. A. Rydberg, 2127, Garrison; C. L. Shear, 369, Garrison, and 372, Deer Lodge.

3. *Leaves flat, smooth on the back, pilose on the nerves above, spikelets crowded.*

**Agropyron repens** Beauv., Agrost., p. 102. A pernicious weed which has been extensively naturalized throughout the United States. The introduced *A. repens* may be distinguished from the indigenous *A. pseudorepens* by its flat green leaves, which are glabrous on the back, scabrous and sparsely hirsute along the nerves above; distichous spikes and green spikelets; lanceolate-acuminate glumes; and short smooth internodes of the rachilla.

Represented in the National Herbarium by specimens from Maine to Vancouver Island, and Virginia to Missouri.

**Agropyron repens pilosum** Scribn. Rachis of the spike pubescent to hirsute; flowering glumes awnless or short cuspidate-pointed.—Scribn. in Fl. Mt. Des. Isl., 183 (1894); Chelsea Beach, Mass., W. Boott, July 15, 1868, in Herb. Gray; and Mount Desert Island, Maine.

**Agropyron repens littoreum** Anders. An erect purplish-green perennial with rigid, reddish-green glaucous leaves, the lowest culm leaves and the basal sheaths hirsute, the empty and flowering glumes awn-pointed.—Salt marshes, Cape Elizabeth, Me. Collected by E. Tuckerman in 1860, and F. Lamson-Scribner in July, 1895. This form is common to the coast of New England and northern Europe.

The following European varieties may occur in this country:

**Agropyron repens agreste** Anders. Spike crowded, dull green with crowded spikelets; empty glumes acute; flowering glume awnless or mucronate or cuspidate; leaves hirsute (above). In barren fields.

**Agropyron repens nemorale** Anders. Spike remotely flowered, bright green, spikelets narrow; empty glumes linear acute; flowering glumes long-awned; leaves scabrous above or more sparingly hirsute, broader and more luxuriant. In meadows and moist woodlands. All of these are exceedingly variable.

## VI. MISCELLANEOUS NOTES AND DESCRIPTIONS OF NEW SPECIES.

### *Paspalum scabrum* Scribn., sp. nov.

Culms 16 inches to 2 feet long, branched below, and geniculate at the lower nodes, striate and downwardly scabrous along the striæ, nodes densely appressed-pubescent, hairs directed downward; sheaths loose, mostly exceeding the internodes, striate, strongly retrorse-scabrous; ligule membranous, about 1 line long, margin fimbriate; leaf blades 2 to 4 inches long, one-half to nearly 1 inch wide, lanceolate, abruptly contracted at the base, acute, rather densely papillate pilose on both surfaces, especially beneath, the narrow portion connecting the blade with the sheath pubescent, margins and mid-nerve ciliate-scabrous. Panicle about 6 inches long, the common axis strongly striate and scabrous; racemes 30 to 50, subfasciculate, about 1 inch long, shortly pedicellate, pedicel dark brown, pubescent; axis of racemes about 1 line wide, flat, or when dry partly folded about the spikelets, very thin, nerved, rough-scabrous along the nerves, especially the stronger middle one produced beyond the spikelets and mucronate pointed. Spikelets uniserial on the very short pubescent pedicels, oblong, obtuse, a little less than 1 line long, white; first glume wanting; second glume very thin, sub-hyaline, 3-nerved, a little longer and broader than the smooth and shining flowering glume.

Allied to *Paspalum mucronatum* Muhl., from which it is distinguished by its retrorsely scabrous culms and sheaths, shorter racemes, uniserial and glabrous spikelets, and in the absence of the first glume. Also allied to *Paspalum gracile* Rudge, but this has smooth culms, sheaths and leaves, rather longer racemes, and larger spikelets, which are nearly 1½ lines long.

Guatemala, No. 3903 Heyde & Lux, 1892.

### *Ichnanthus lanceolatus* Scribn. & Smith, sp. nov.

An erect or ascending, caespitose, branching perennial 1 to 2 feet high, with lanceolate leaves and simple panicles of few loosely flowered racemes. Sheaths shorter than the internodes, ciliate along the margins, otherwise smooth, or the lowermost pubescent; ligule a short ciliate fringe of hairs; leaf blade 1 to 3 inches long, one-fourth to one-half inch wide, lanceolate acute, smooth, many-nerved, with a narrow, cartilaginous margin, abruptly narrowed at the base, this contraction forming in the lower leaves, especially those of the sterile shoots, a slender channeled petiole, which, like the sheaths, is ciliate along the margins. Panicle branches erect or ascending (spreading in anthesis), 1 to 2 inches long, the uppermost

shorter. Spikelets in pairs, one sub-sessile, the other raised on a pedicel about as long as itself. Spikelets ovate-lanceolate, acute, glabrous, about 2 lines long; first glume ovate, acute, strongly 3-nerved, one-half to three-fourths the length of the spikelet, scabrous on the mid-nerve above; second glume ovate-lanceolate, acuminate, 5-nerved, nearly clasping the similar empty third glume; base of the fourth glume surrounded by the third; fourth glume about  $1\frac{1}{2}$  lines long, oblong-lanceolate, obtuse, 5-nerved, very smooth and closely rolled about the palea, which is of similar texture.—“Old fields about Izamal, No. 854. George F. Gaumer, September, 1895.” Yucatan. *nom. vulg.*, “Xkanchim.”

**Triodia drummondii** Scribn. & Kearney, sp. nov.

A rather slender, erect perennial, 3 to 4 feet high from strong, scaly rootstocks, with long (8 to 16 inches) radical leaves, and contracted panicles 6 to 8 inches long. Culms simple, naked above, smooth; nodes 2 to 4, dark purple; sheaths of the basal leaves crowded, somewhat compressed, closely imbricated, sparsely to densely pilose, with long white hairs; upper leaf sheaths shorter than the internodes, glabrous or pilose at the throat; ligule a dense fringe of very short white hairs; blades of the radical leaves about  $2\frac{1}{2}$  lines wide, attenuate, acuminate and involute toward the apex, shortly pilose below near the base; uppermost caudine leaf  $1\frac{1}{2}$  inches long or less. Panicle somewhat drooping, simple, the appressed rays solitary, the lowermost 1 to 2 inches long, slightly glandular, but not villose, in the axils. Spikelets 4 to 5 lines long, usually 3-flowered; outer glumes ovate-acute, 1-nerved, whitish or purplish, except the prominent nerve, 2 to  $2\frac{1}{2}$  lines long, subequal; third or flowering glume  $2\frac{1}{2}$  to 3 lines long, ovate-lanceolate, bifid, 3-nerved, the nerves extending into short, awn-like teeth, the central one equaling or a little exceeding the narrow obtuse lobes of the glume, nerves ciliate in the lower half with rather long, erect, white hairs; palea slightly shorter or a little longer than the glume, ob lanceolate, obtuse, minutely ciliolate along the keels toward the apex.

Jacksonville, Fla. (Drummond); Aiken, S. C. (Ravenel); Biloxi, Miss., growing in dry soil in low pine barrens (324 Kearney, 1896). There is also a specimen in the National Herbarium from Georgia, without locality.

Allied to *Triodia seslerioides*, but distinguished by its scaly rootstocks (resembling those of *Panicum anceps*), pilose sheaths, contracted, simple panicles, and larger, usually fewer-flowered, spikelets.

**Elymus robustus** Scribn. & Smith, sp. nov.

Stout, erect cæspitose perennials 3 to 6 feet high, with leafy culms and a stout bearded spike. Culms cylindrical, smooth and shining, 2 to 3 lines thick; nodes glabrous; sheaths finely striate, glabrous or minutely retrorsely scabrous between the nerves, scarious on the margin, open at the throat, exceeding the internodes; ligule very short, coriaceous, entire, with short acute lateral auricles; blades constricted at the base, striate, rigid, coriaceous, linear-lanceolate, attenuate to the pungently pointed apex, 4 to 10 lines wide, 9 to 15 inches long, strongly scabrous on both sides and on the margin; spike shortly exserted from the uppermost leaf sheath, cylindrical, erect, 5 to 7 inches long, 1 to 2 inches in diameter; rachis compressed, smooth, and glabrous except on the scabrous angles; spikelets in threes or fours, 3- to 4-flowered; empty glumes 5 to 6 lines long, linear, subulate, rigid, erect, 2- to 5-nerved, tipped with an awn twice as long; flowering glumes 6 to 8 lines long, narrowly linear-lanceolate, attenuate above, dorsally compressed, elevated on a short stipe, 5-nerved above the middle, minutely scabrous, or pubescent, bifid at the apex and awned from between the setaceous teeth with a stout straight or curving scabrous awn  $1\frac{1}{2}$  to 2 inches long; palea 1 line shorter than its glume, linear, acute, broadly sulate, bicarinate, scabrous on the keels above.

Has been regarded a variety of *E. canadensis* Linn.

Specimens examined from Illinois, Iowa, Kansas, and Montana.

**Elymus intermedius** Scribn. & Smith, sp. nov.

Culms rather stout, erect from a perennial root; leafy, terete, glabrous, 2 to 3 feet high; sheaths striate, glabrous, longer than the internodes, the uppermost somewhat inflated; ligule almost obsolete; leaves linear, erect, attenuate to the filiform or acuminate apex, scabrous throughout, 4 to 7 inches long, 2 to 3 lines wide. Spike slender, erect, 2½ to 4 inches long, cylindrical, barely exserted from the upper leaf-sheath, the rachis pubescent; spikelets mostly in twos or rarely threes, erect; empty glumes linear-lanceolate, or linear, thickened and coriaceous at the base, 3- to 5-nerved above, hirsute, 5 lines long, 1 to 1½ lines wide, tipped with a scabrous awn shorter than or about as long as the glume; flowering glume on a short stipe, lanceolate, acute, 5-nerved, hirsute-pubescent, 4 to 4½ lines long, tipped with a slender, scabrous awn 7 to 8 lines long; palea a little shorter than its glume, hispid on the keels above the middle, obtuse or retuse; grain adherent to both flowering glume and palea, 2½ lines long, dorsally compressed, sulate next the palea, acute at the base, rounded and hispid at the apex; hilum extending the full length of the grain.

Distinguished from *E. canadensis* by its erect spikes and wider, short-awned empty glumes; from *E. virginicus* by its straighter empty glumes, less strongly thickened at the base, and by its hirsute spikelets. From Maine to Virginia, west to Illinois and Nebraska.

**Elymus angustus** Trin. in Ledb. Fl. Alt., I, 119.

A rather rigid, erect, cæspitose grass 1½ to 3 feet high, with flat leaves and minutely pubescent spikes 4 to 7 inches long. Culms cæspitose, striate, smooth, somewhat geniculate at the lower nodes; sheaths about equaling the internodes, smooth, glaucous, open at the throat, the uppermost somewhat inflated; ligule membranous, very short, leaf blades rigid, linear, 3 to 6 inches long, 1½ to 3 lines wide, smooth below, scabrous above and along the involute margins, attenuate to the pungently pointed apex. Spikes rather slender, their bases inclosed in the uppermost leaf sheaths finally exserted; rachis pubescent. Spikelets in pairs, 2- to 3-flowered, erect appressed, pubescent; empty glumes subulate from a narrowly lanceolate base, awn-pointed, scabrous, 6 lines long; flowering glumes lanceolate acuminate, compressed on the back below, 4 to 5 lines long, tipped with straight scabrous awns 2 to 3 lines long; palea shorter than the glume, minutely bidentate. This plant agrees so well with typical specimens in the National Herbarium that we have no hesitation in referring it to that species.

Related to *E. dasystachys* Trin. Spikelets fewer-flowered and awns longer.

Wyoming, along the banks of Green River. No. 284 C. L. Shear, June 25, 1895. This seems to be the first time that this species has been collected within our territory.

**CHÆTOCHLOA** Scribn., nom. nov. *Setaria* Beauv. *Chamaeraphis* Kuntze in part, not R. Br. *Ixophorus* Nash, not Schlecht.

The name *Setaria*, which has been taken up by many botanists for a number of well-known weedy grasses with dense, spike-like, bristly panicles, was first applied by Beauvois (in Oware and Benin.) to a species of *Pennisetum*. At an earlier date the name was employed by Acharius to designate a genus of lichens. According to all rules of botanical nomenclature, this last fact renders the name untenable for designating a genus of flowering plants; and were this not the case, its first application to a species of *Pennisetum* placed it at once among the synonyms, which, according to recent rulings, would debar its further use. Some botanists have referred the grasses in question to the genus *Panicum*, from the species of which they differ only in the presence of setæ issuing from the pedicels of the spikelets below their articulation. It is this character, combined with their inflorescence, which led them to be separated from *Panicum*, in which genus the earlier-described species

were first placed. The taking up of the name *Chamaeraphis*, a genus established by R. Brown upon certain Australian and south Asiatic grasses having spikelets like those of *Panicum*, but with the partial rachis of the inflorescence produced into long awn-like points beyond the insertion of the upper or only spikelet, appears to have been ill advised, and the more recent adoption of *Ixophorus* for *Setaria* is equally so. The latter genus, *Ixophorus*, possesses well-marked characters of generic value for distinguishing it, and the same is true of *Chamaeraphis*. Neither of these names can be taken up for *Setaria*, unless they are used in a very broad sense to include all the species of *Panicum* thrown by Steudel into the section *Setaria*—that is, those species, as Schlechtendal states it, having *spiculae in axibus inflorescentia varie erolutis pedicellata sessilieare, axium sterilium, scias armulantium majore minorere copia cum spiculis nascente*. This would bring together a heterogeneous assemblage of species, the natural result of the adoption of too artificial characters, which, with our present ideas of genera, would be much more easily and more systematically treated if divided into genera upon more natural and genetic characters. While our *Setarias*, so called, might under a broad conception of the genus *Panicum* be referred to it, they seem to form a well-marked group, as indicated by the characters noted above, which it seems best to maintain as a genus, under the new name *Chaetochloa*, *Chamaeraphis* and *Ixophorus* being both well-defined genera and abundantly distinct. Among the species belonging to this genus are the following: *Chaetochloa verticillata* (L.) Scribn., n. n. (*Panicum verticillatum* Linn.); *C. glauca* (L.) Scribn., n. n. (*Panicum glaucum* Linn.); *C. viridis* (L.) Scribn., n. n. (*Panicum viride* Linn.); *C. italicica* (L.) Scribn., n. n. (*Panicum italicum* L.); *C. imberbis* (Poir.) Scribn., n. n. (*Panicum imberbe* Poir.); *C. grisebachii* (Fourn.) Scribn., n. n. (*Setaria grisebachii* Fourn., *Setaria pauciseta* Vasey in part); *C. flava* (Nees) Scribn., n. n. (*Panicum flavum* Nees); *C. penicillata* (Willd.) Scribn., n. n. (*Panicum penicillatum* Willd.); *C. setosa* (Swz.) Scribn., n. n. (*Panicum setosum* Swartz); *C. magna* (Griseb.) Scribn., n. n. (*Setaria magna* Griseb.); *C. composita* (HBK.) Scribn. n. n. (*Setaria composita* HBK.); *C. corrugata* (Ell.) Scribn., n. n. (*Setaria corrugata* Ell.).

## EXPLANATION OF PLATES.

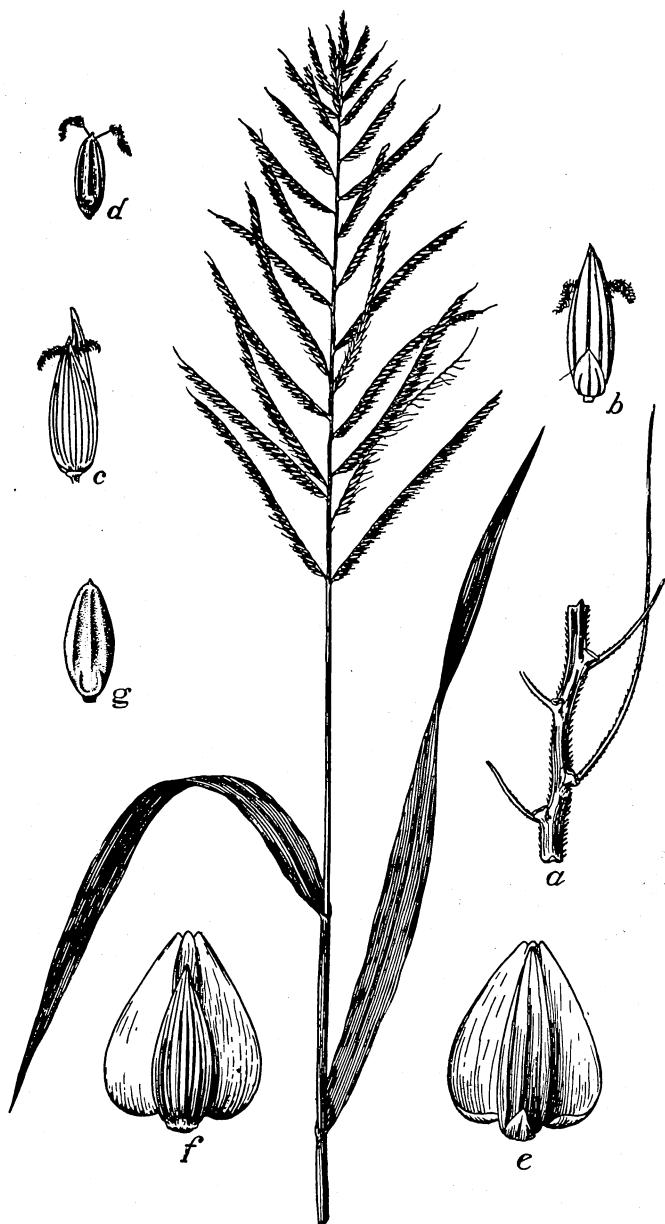
PLATE I.—*Ixophorus unisetus*: *a*, a portion of the rachis of one of the racemes; *b*, a spikelet showing back of the first and third glumes; *c*, a spikelet showing the many-nerved second glume; *d*, fourth or flowering glume seen from the back with the projecting styles and stigmas; *e*, spikelet in fruit, showing the first and third glumes and the broad wing-like margins of the palea of the third glume; *f*, the same as *e*, seen from the other side; *g*, dorsal view of the fourth glume in fruit.

PLATE II.—*Ixophorus pringlei*: *a*, mature spikelet showing dorsal views of the first and third glumes and the broad wing-like expansions (*a'*) of the palea of the third glume; *b*, the same seen from the other side; *c*, palea of the third glume at maturity; *d*, dorsal view of fourth glume.

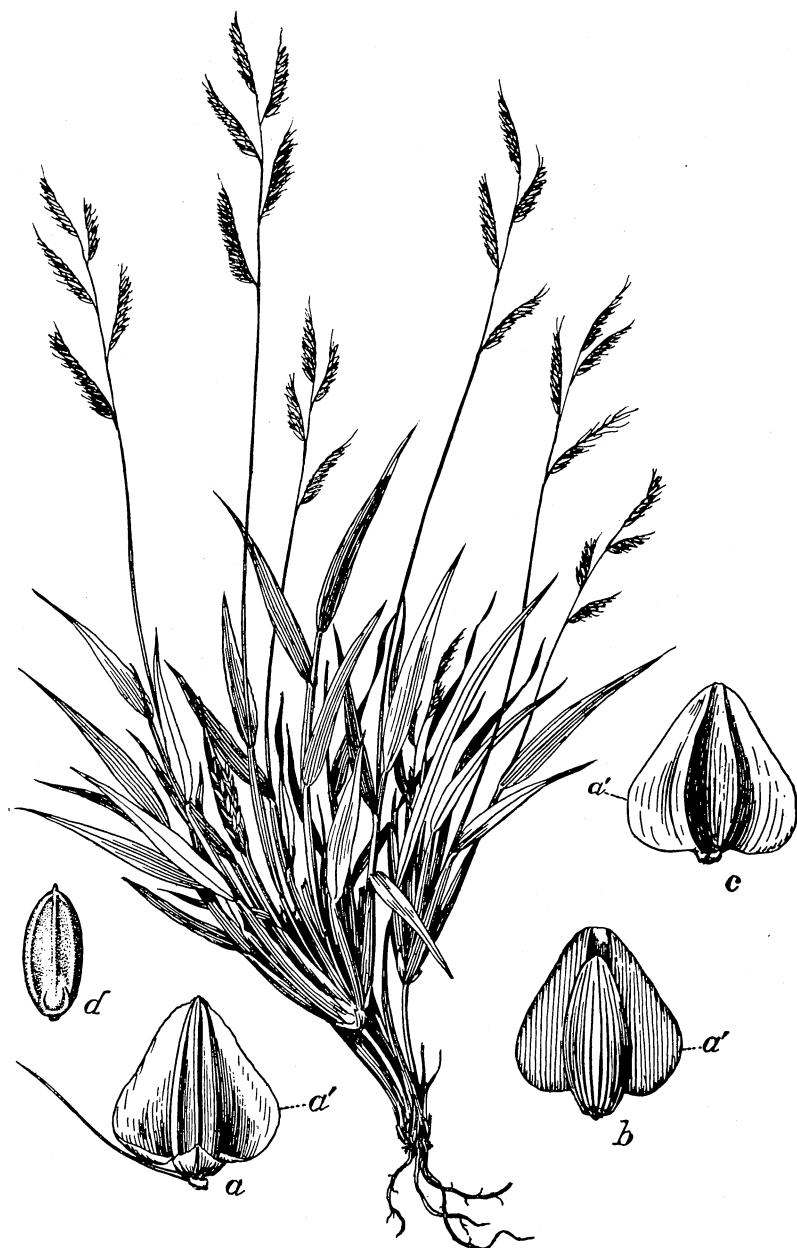
PLATE III.—*Paspalum scabriusculum*: *a*, a portion of the axis of one of the racemes bearing six spikelets; *b*, a spikelet showing back of the second or flowering glume; *c*, spikelet showing back of the empty glume; *d*, the empty glume.

PLATE IV.—*Panicum biglandulare*: *a*, spikelet seen from the side; *b*, the same, showing the first and third glumes, upon the latter the two glands are indicated; *c*, dorsal view of the fourth glume; *d*, anterior view of the same, showing the palea partly surrounded by the glume, and the stigmas.

PLATE V.—*Ichnanthus lanceolatus*: *a*, spikelet from the side; *b*, spikelet showing base of the first and back of the third glumes; *c*, fourth or flowering glume; *d*, spikelet with the first glume removed, the third glume partly inclosed by the second; *f*, base of flowering glume.



*IXOPHORUS UNISETUS.*



*IXOPHORUS PRINGLEI.*



PASPALUM SCABRIUSCULUM.





ICHNANTHUS LANCEOLATUS.

# I N D E X.

[Synonyms are in *italic*, valid species in roman, and new names or new species in antique type.]

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